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McGillick, Sr. et al.

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(54) **SHORELINE EROSION AND FLOOD CONTROL SYSTEM AND METHOD**

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(52) **U.S. Cl.** **405/16**; 405/302.6; 220/23.4; 206/504

(58) **Field of Classification Search** 220/23.2, 220/23.4, 23.6; 206/503, 504; 405/15–19, 405/21, 302.4, 302.6, 302.7
See application file for complete search history.

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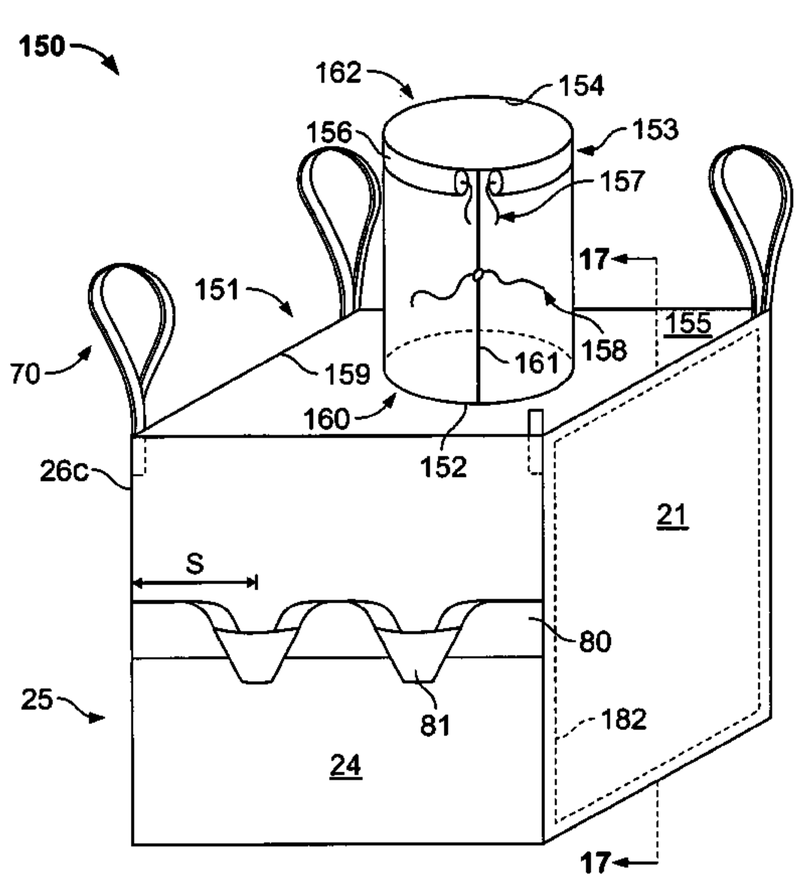
(57) **ABSTRACT**

A bulk container and method suitable for forming an interlinked wall. In one embodiment, the bulk container may generally include sidewalls, lifting straps for transporting the container, and a closeable top. Linking loops may be provided on at least one sidewall which are each configured to be engaged by connecting members to link adjacent bulk containers together for forming an interlinked wall. In one embodiment, the connecting member is a belt which may be tensioned. Another possible embodiment includes a linking strap affixed to the sidewall panel and to which the linking loops may be attached or formed as an integral part thereof. A barrier wall system and method of forming the same from interlinked bulk containers is also provided. The barrier wall system is suitable for use in, but not limited to, shoreline erosion protection and flood control applications.

27 Claims, 9 Drawing Sheets



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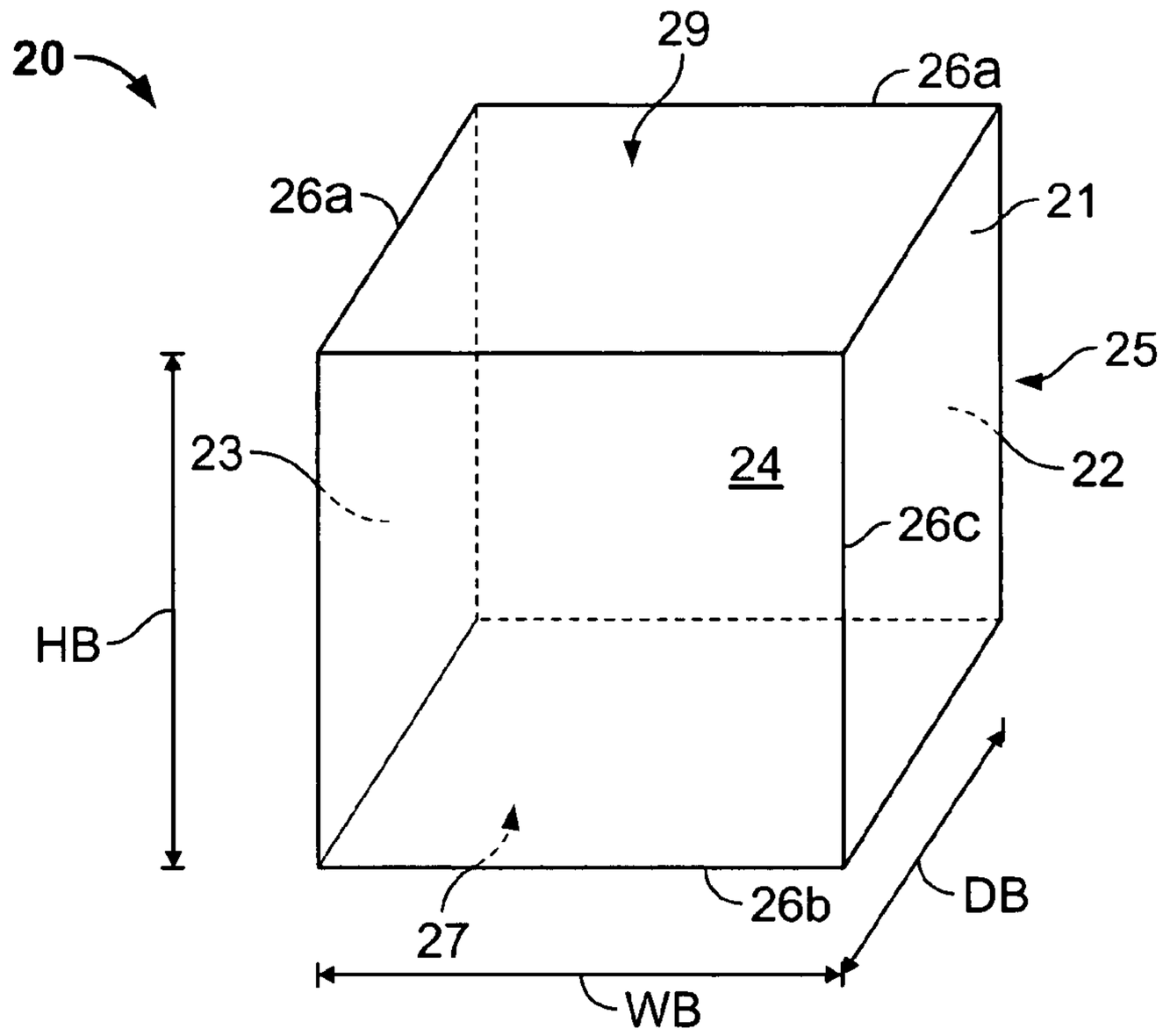
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FIG. 1

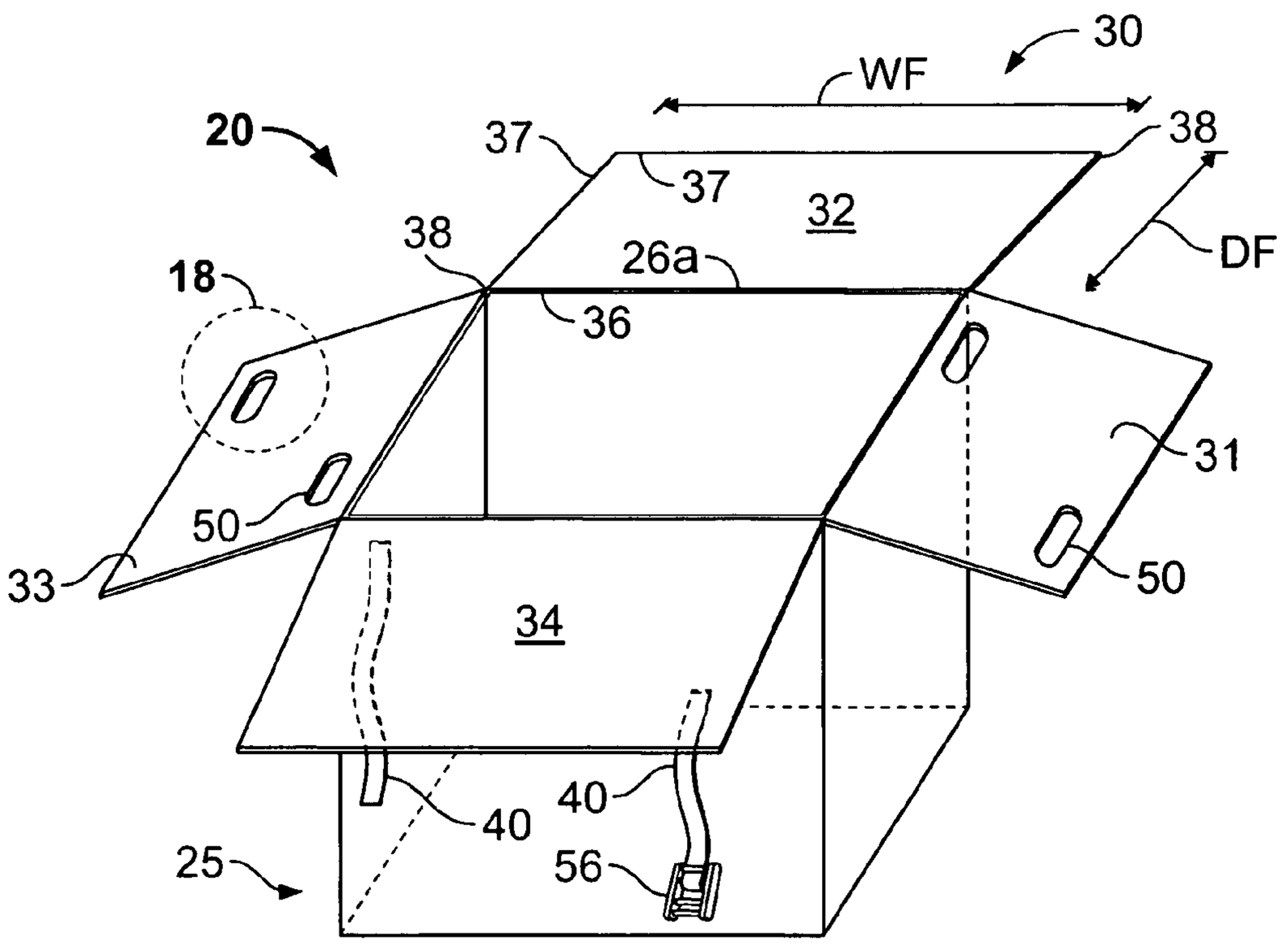
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FIG. 2

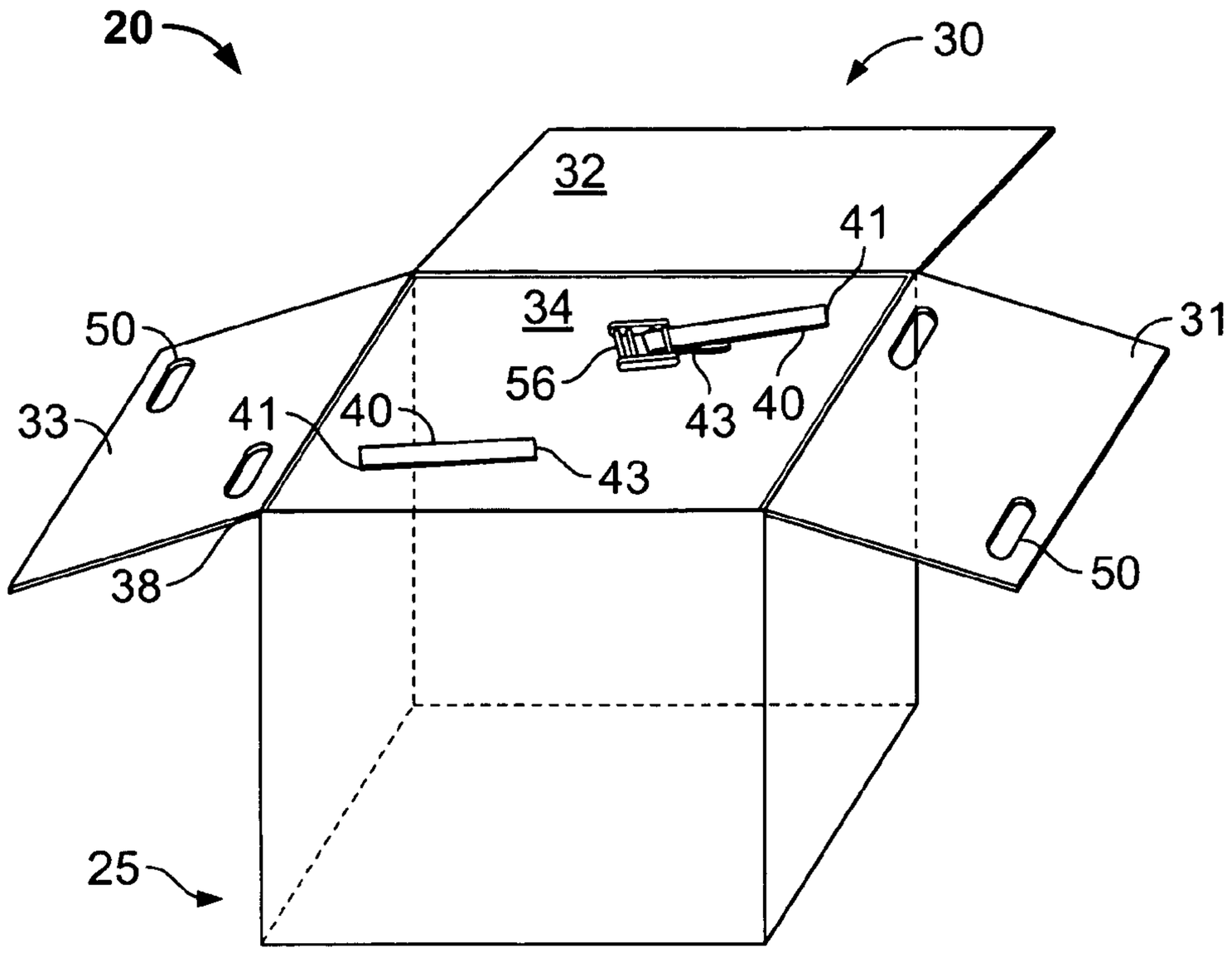
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FIG. 3

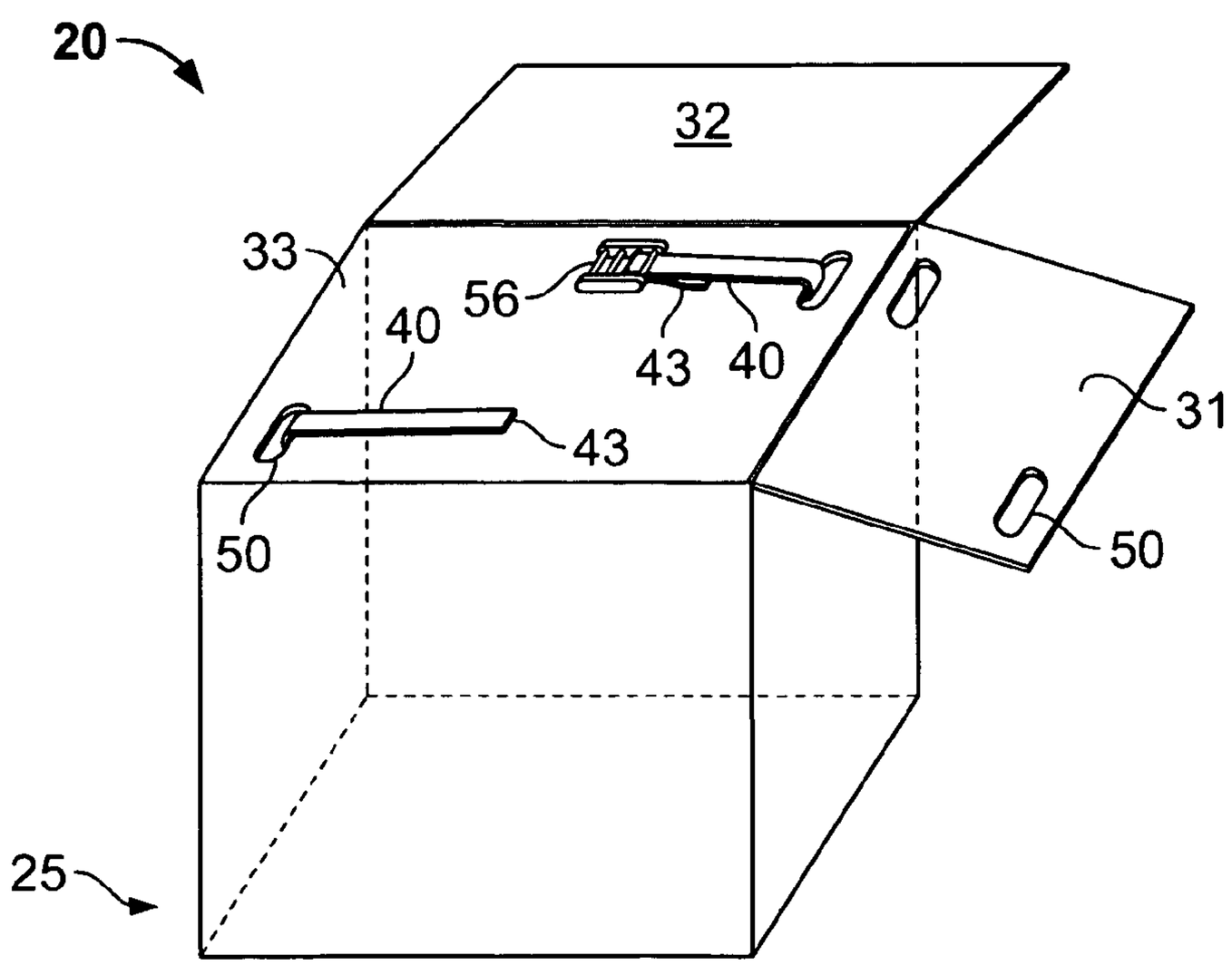
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FIG. 4

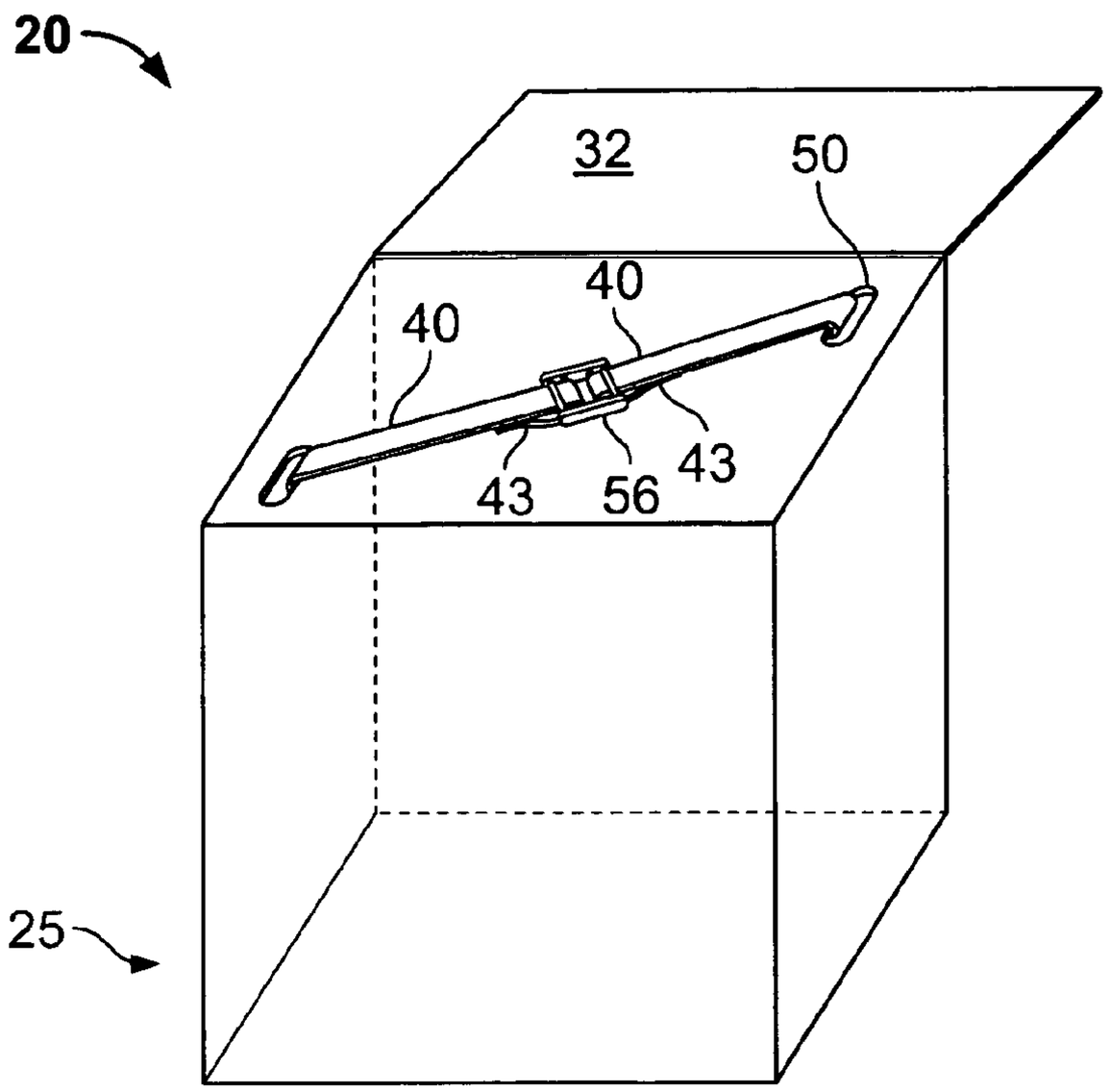
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FIG. 5

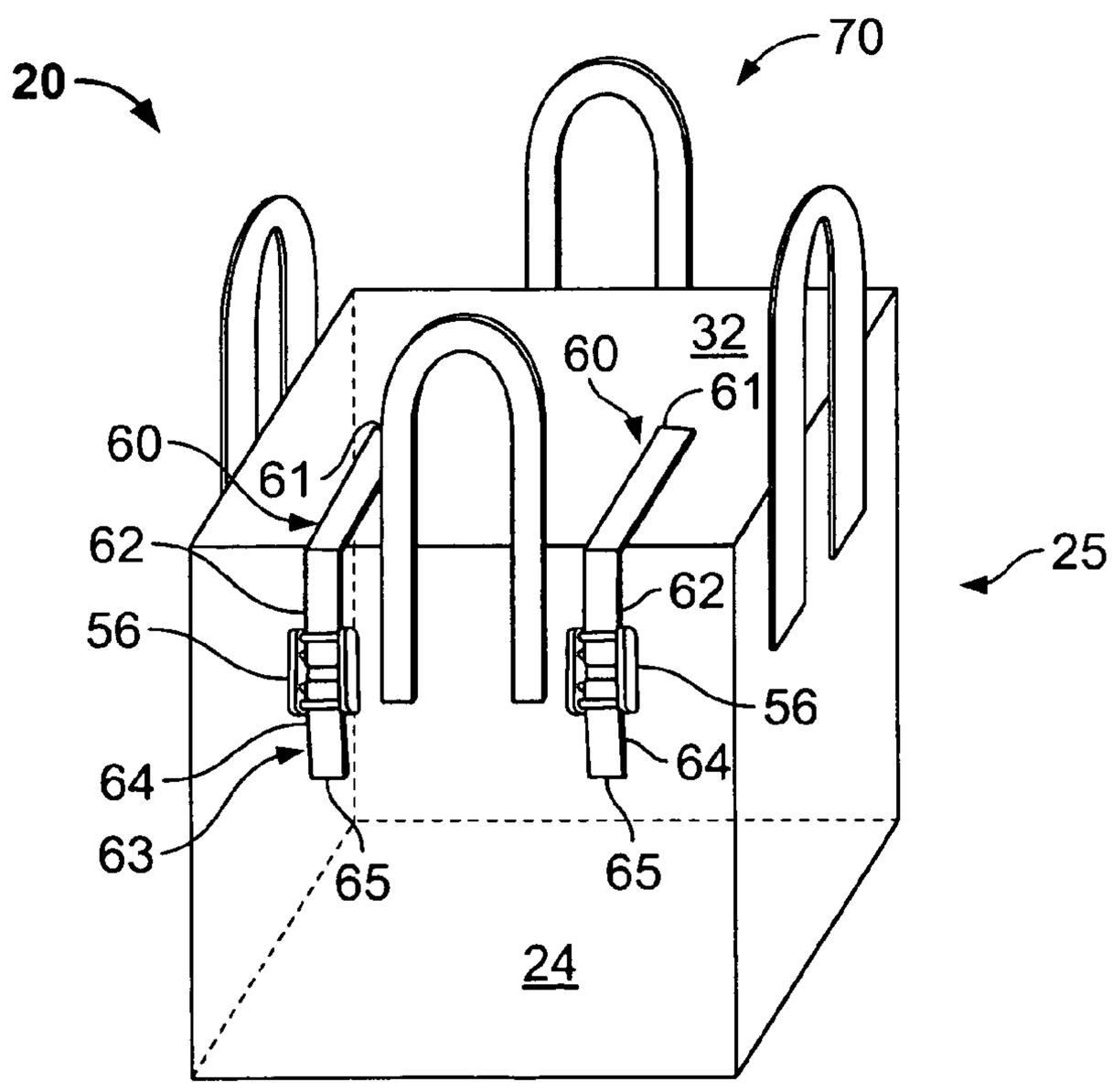
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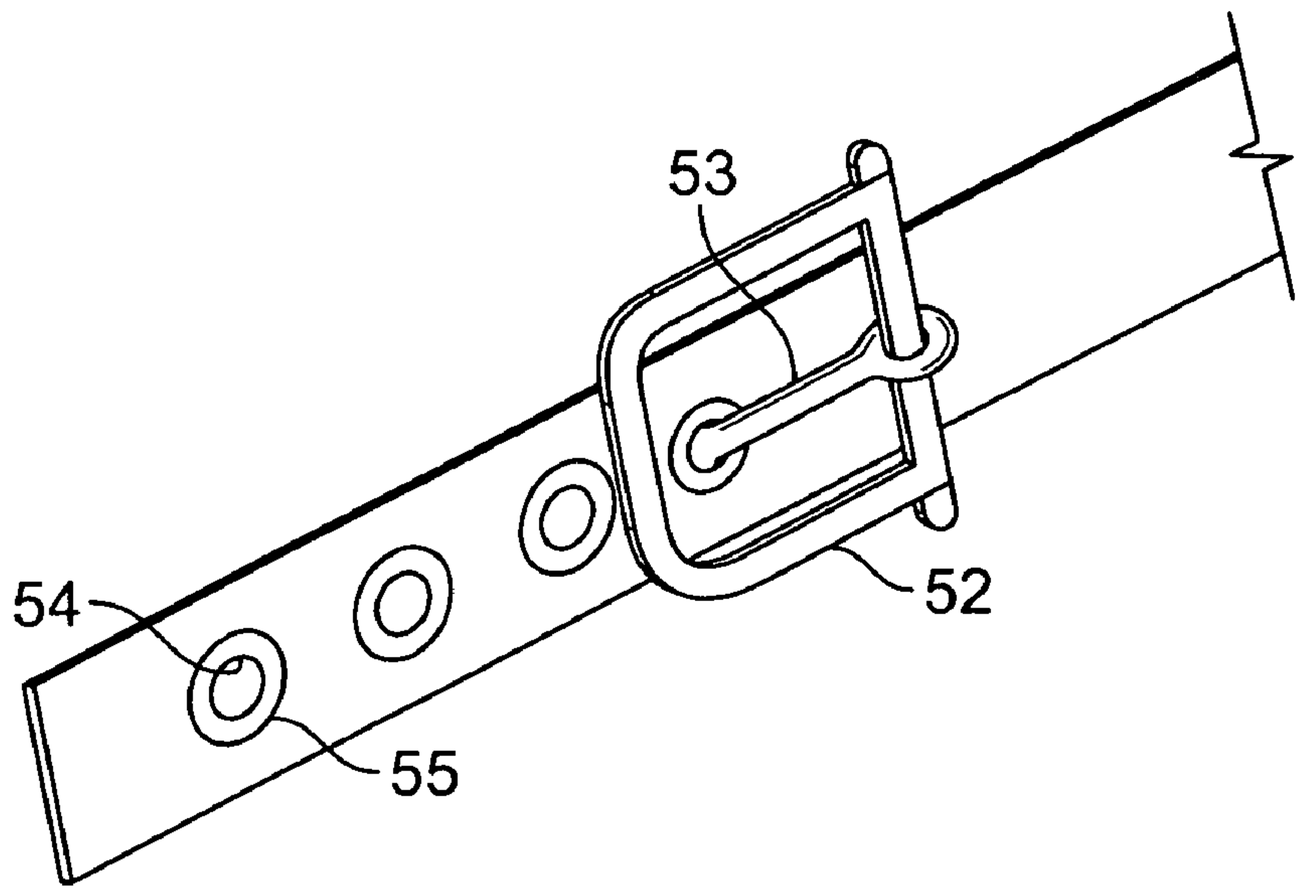
FIG. 6



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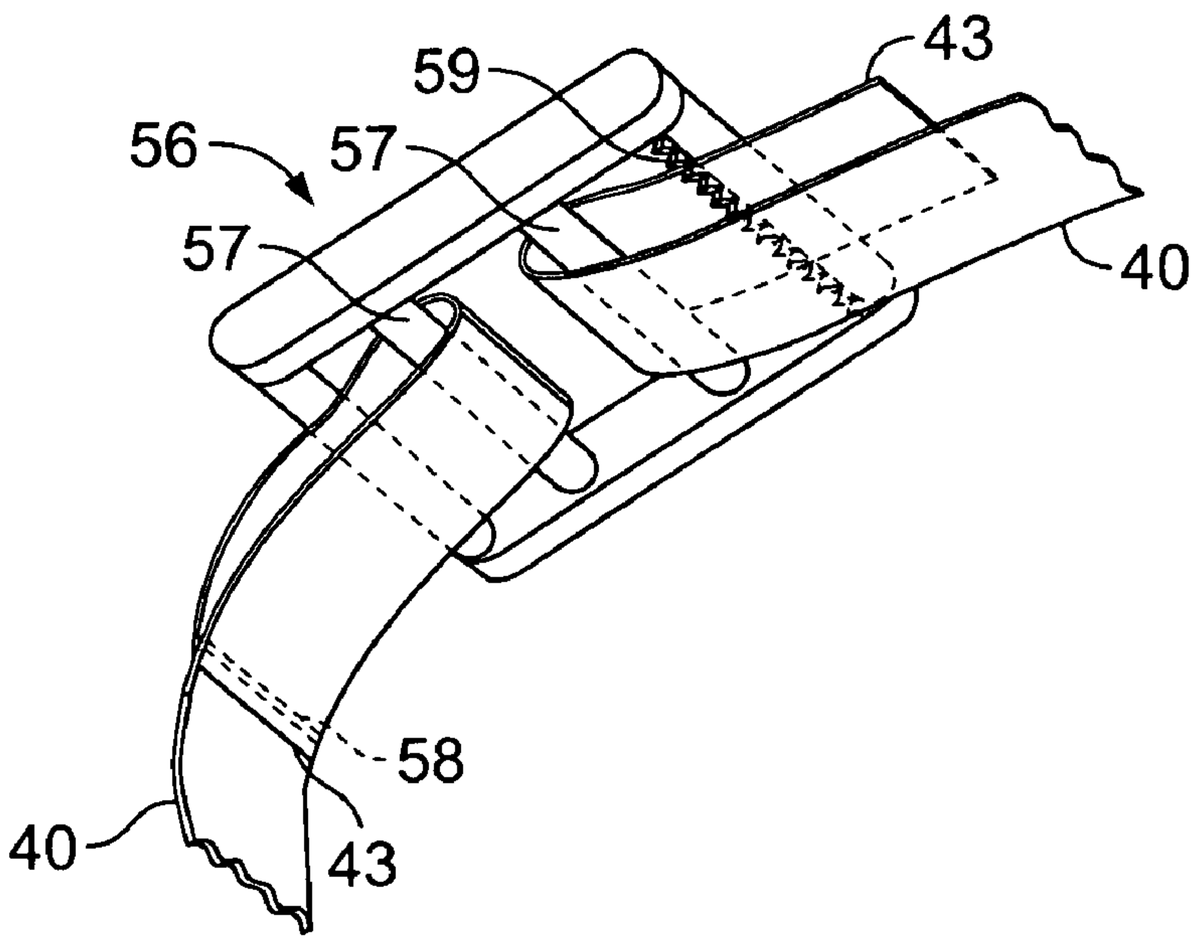

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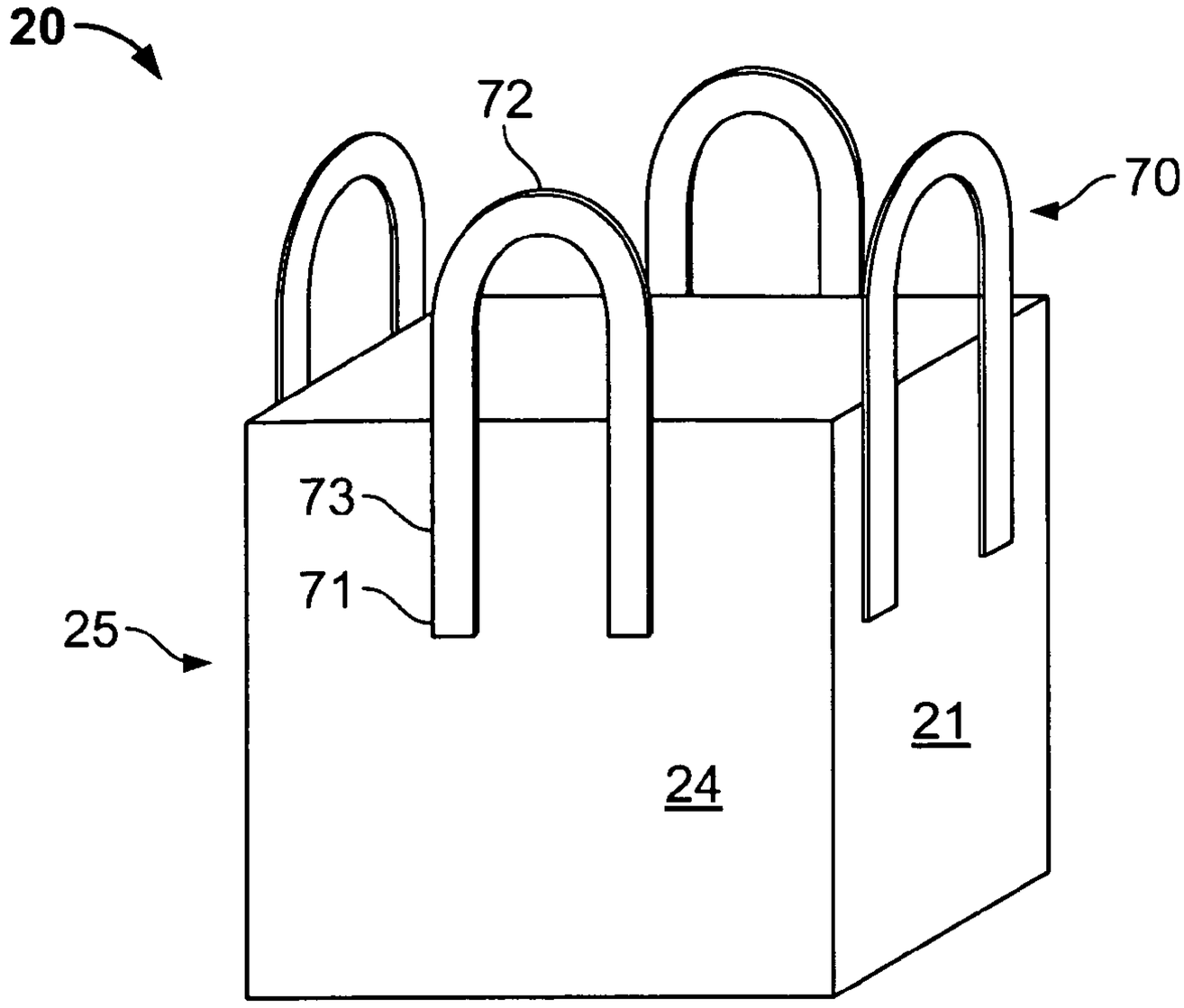
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FIG. 9

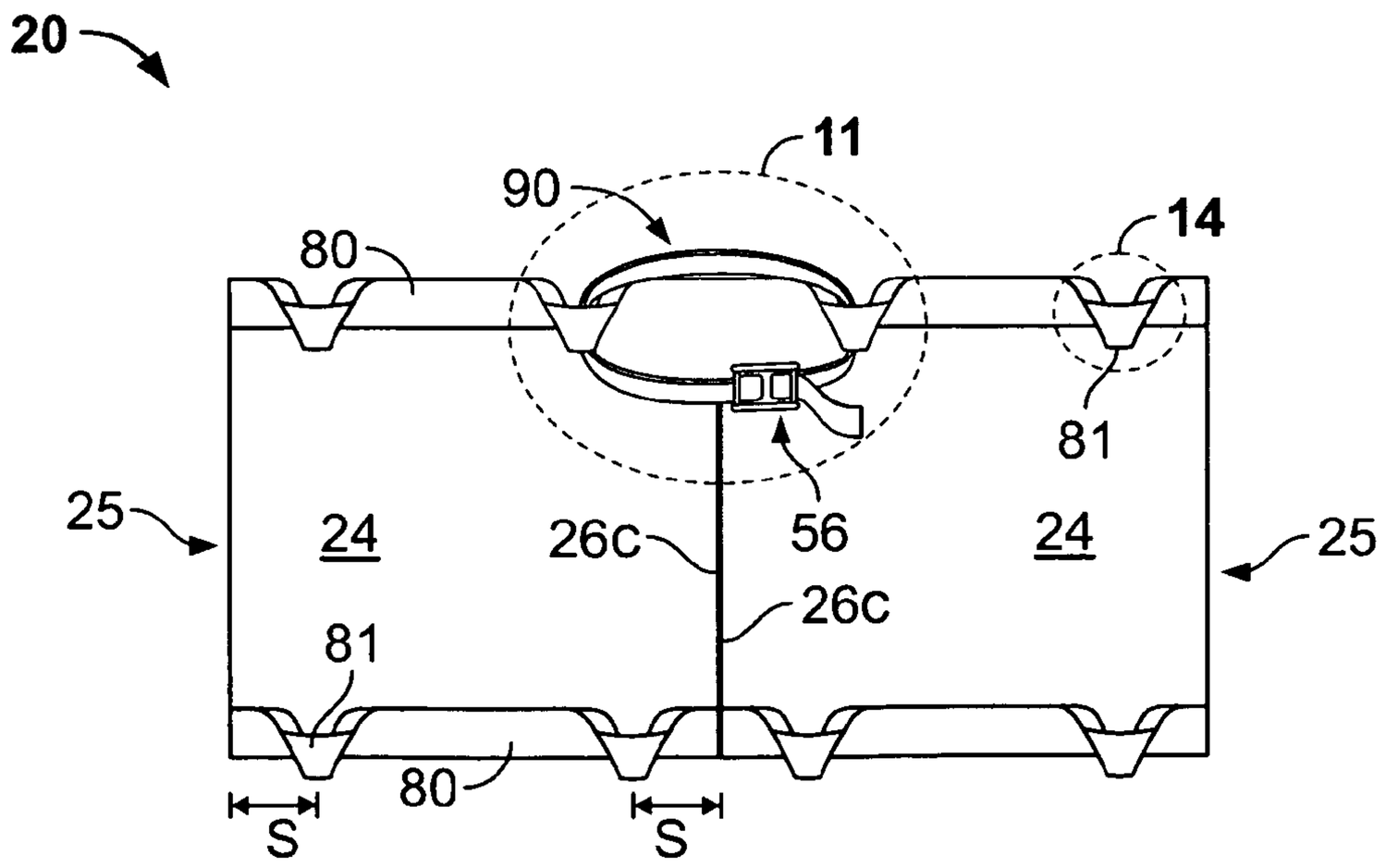
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FIG. 10

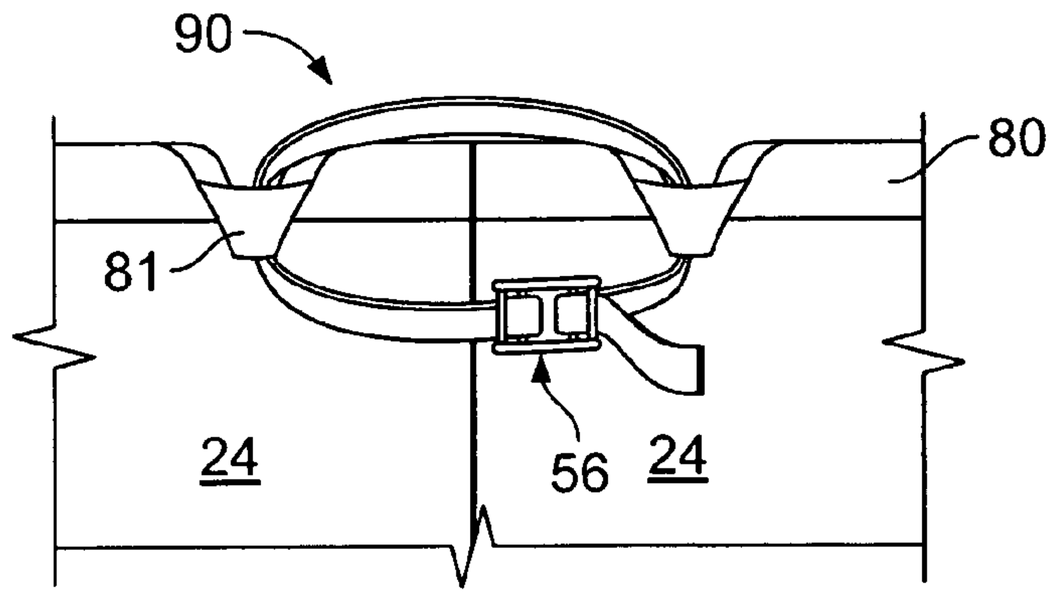
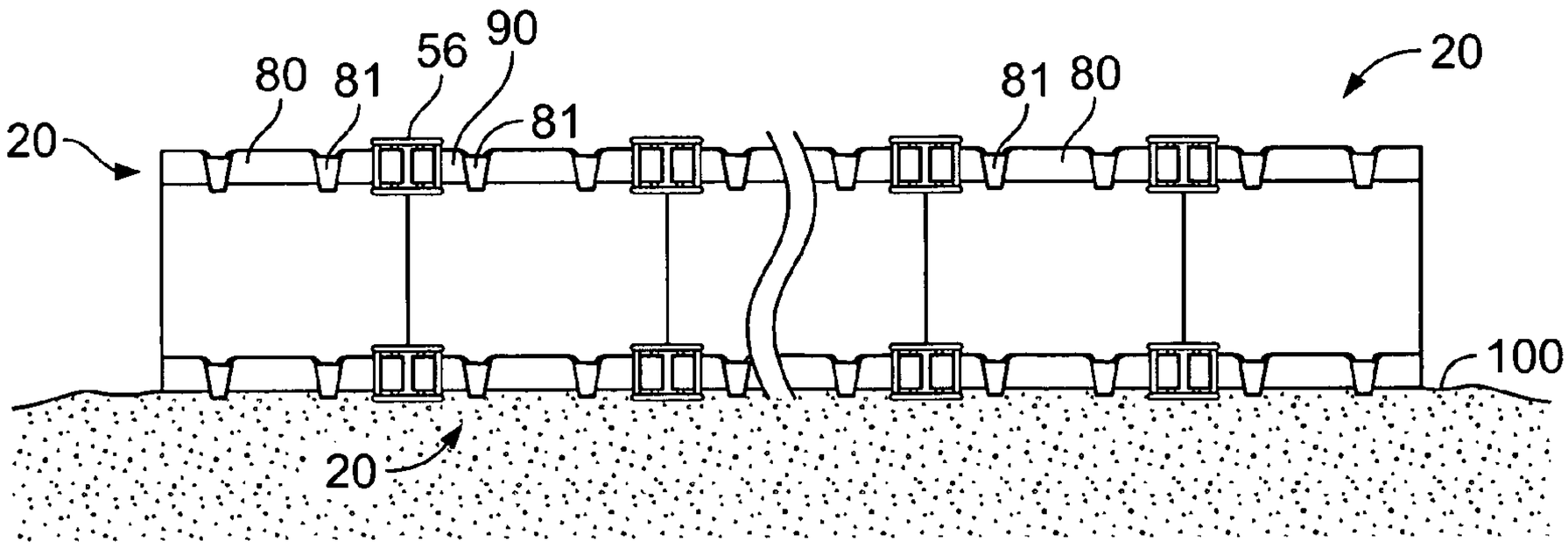


FIG. 11



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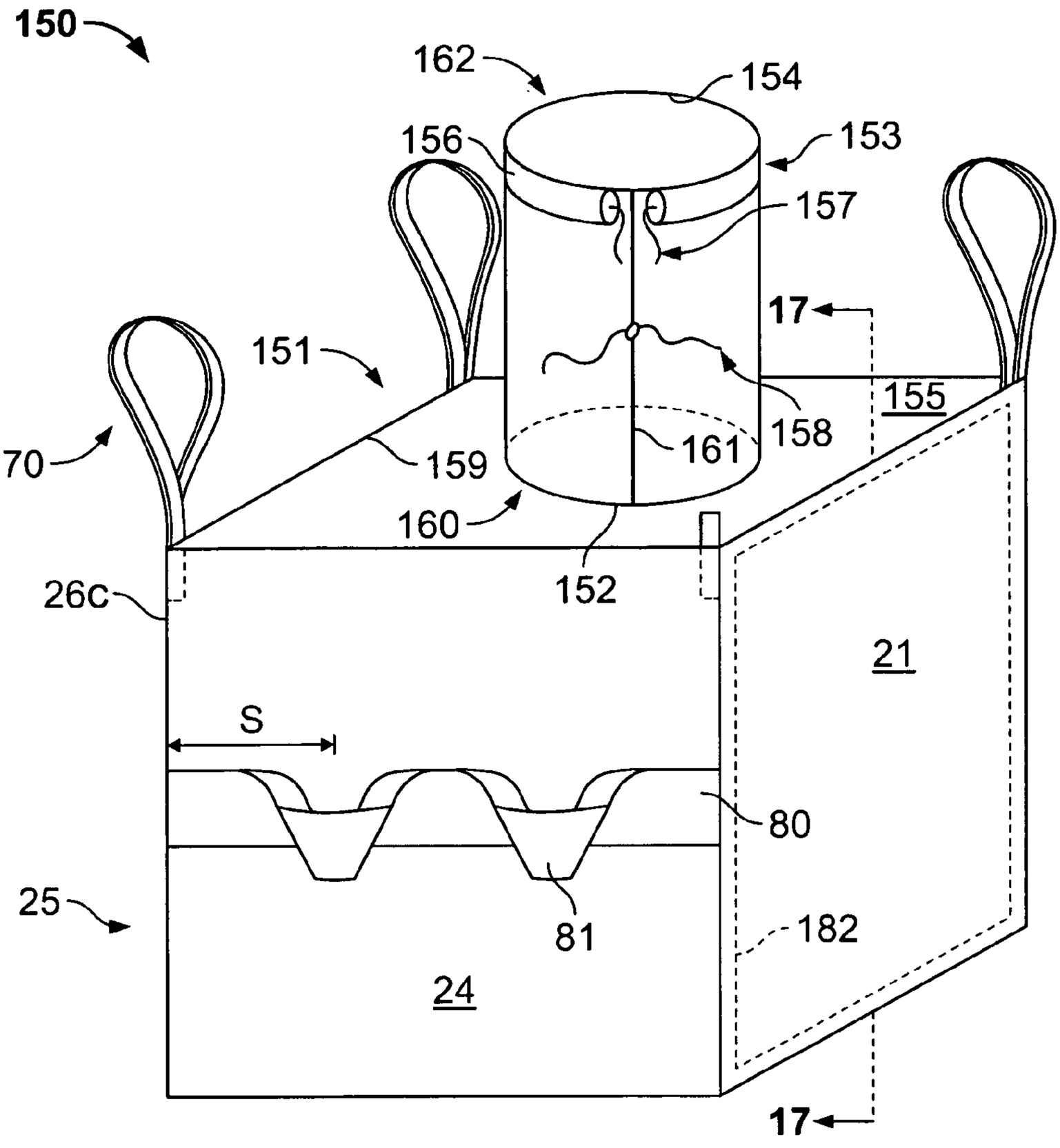
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FIG. 13

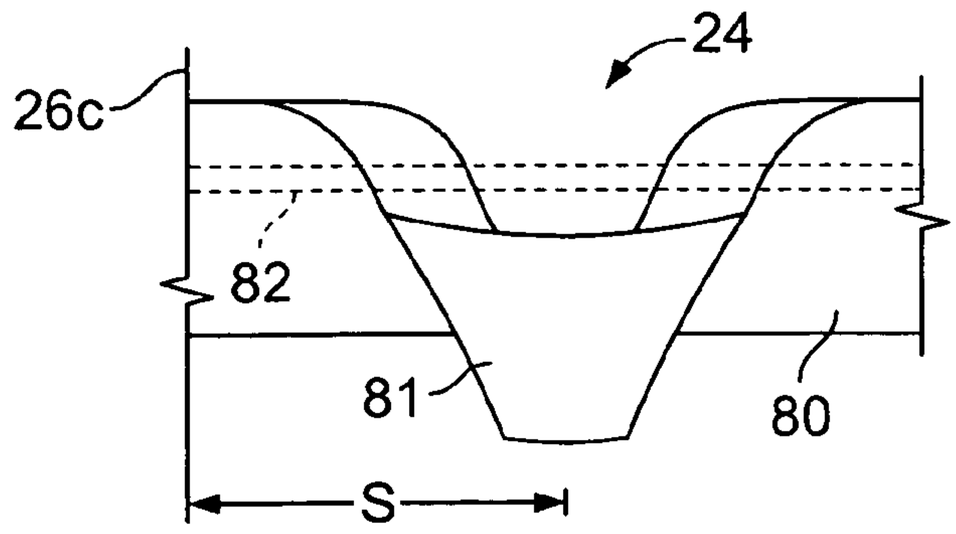
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FIG. 14

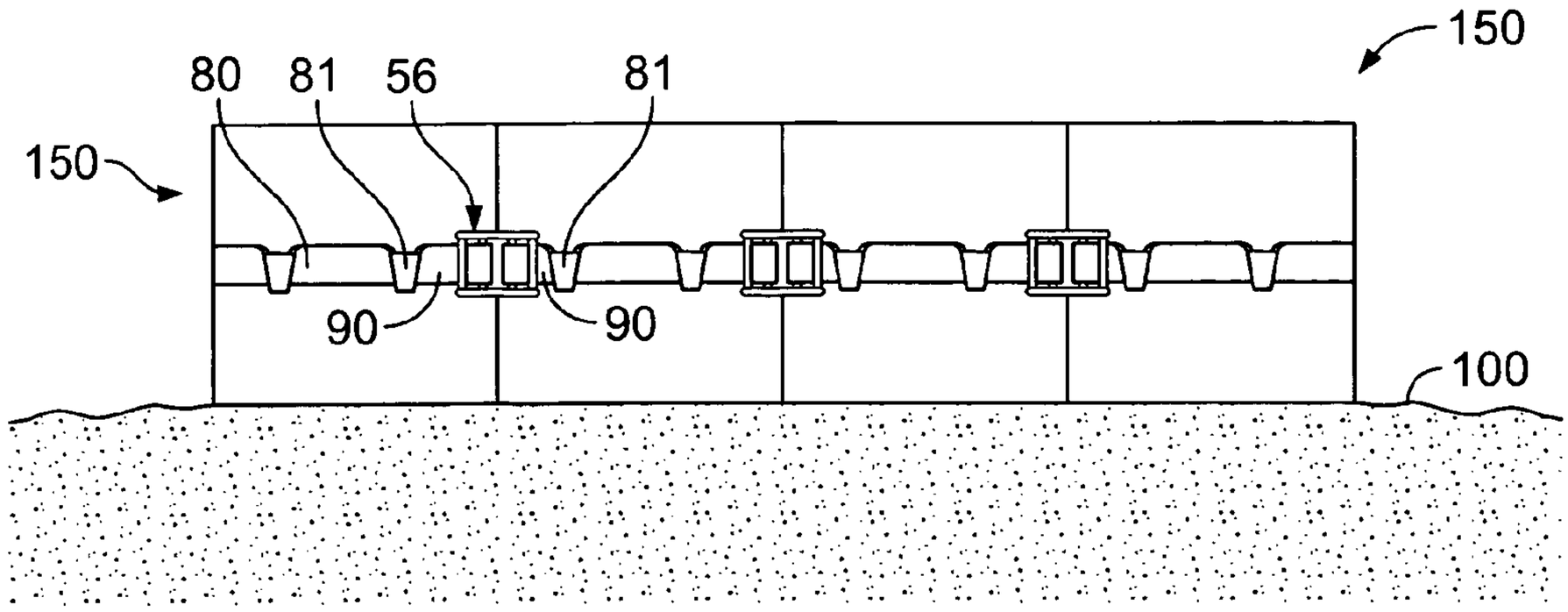

FIG. 15

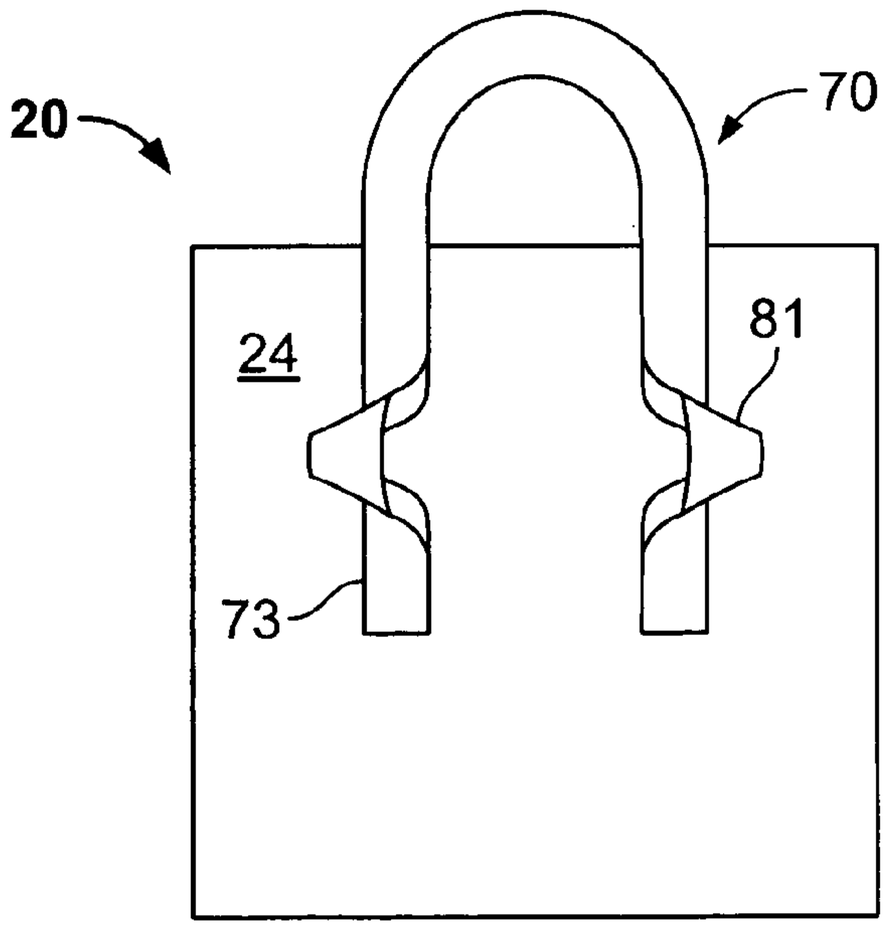

FIG. 16

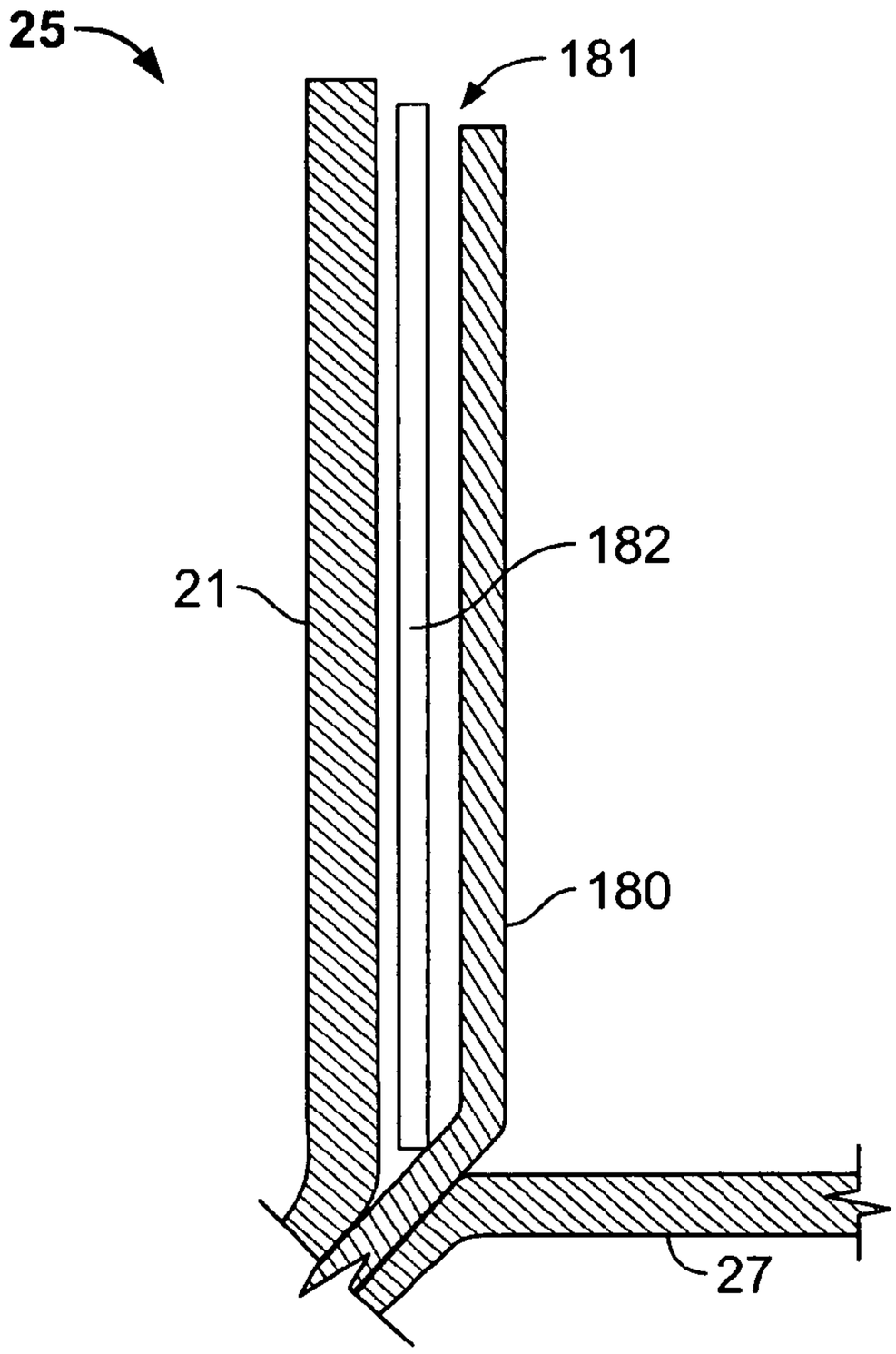

FIG. 17

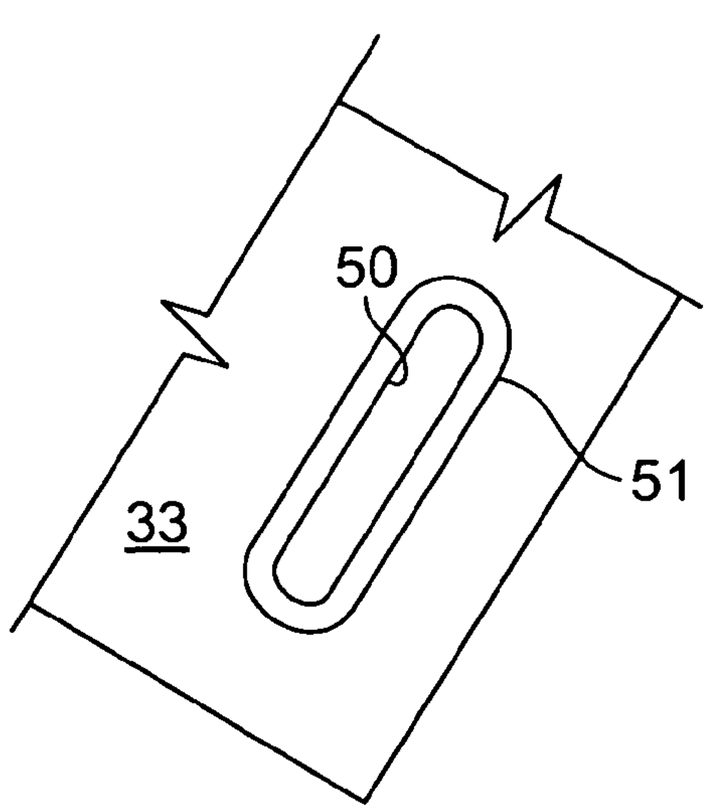

FIG. 18

SHORELINE EROSION AND FLOOD CONTROL SYSTEM AND METHOD

FIELD OF THE INVENTION

The present invention generally relates to bulk storage containers, and more particularly to an improved flexible bulk container system and method of use suitable for, but not limited to, shoreline erosion protection and flood control applications.

BACKGROUND OF THE INVENTION

Mitigation and control of shoreline or beach erosion has presented challenging problems to many seaside communities. Waves driven by seasonal storms if unabated can readily consume valuable and irreplaceable shoreside property. A common solution to date has consisted primarily of erecting bulkheads or barriers on the susceptible beach area to intercept and disperse incoming waves. Various materials have been used as building blocks to construct these bulkheads or barriers. One approach has been to construct the bulkhead of very heavy materials, such as large boulders or various large concrete shapes that resist dislodgement by the waves due to their weight. Due to consideration for aesthetics, and a desire not to permanently introduce additional materials which may be foreign to the natural environment, some seaside municipalities have adopted a policy of allowing bulkheads or barriers to be installed on a seasonal basis only for temporary use during peak storm season from spring to fall.

The foregoing approaches, however, have not been suitable for such temporary applications and have many drawbacks. The boulders and concrete shapes are extremely heavy and may be difficult to rig for lifting and placement by heavy machinery such as cranes or front-end loaders. Their size and weight also makes these bulkhead materials not readily portable, and expensive to transport to the installation site. Accordingly, the foregoing materials are ill-suited for shoreline protection applications where temporary placement, ease of removal, portability, and costs are a concern.

Accordingly, there is a need for an economical shoreline erosion protection and flood control system which can be readily installed at the beginning of the season and removed at the end. There is further a need for a shoreline erosion protection system that provides improved portability, ease of handling and transportation, cost-savings over conventional bulkhead materials, and preferably is environmentally benign. There is a further need for such a system which can also be used in flood control applications.

SUMMARY OF THE INVENTION

The foregoing needs are met by the present invention which provides an improved bulkhead or barrier wall system and method of use adapted for use in, but not limited to shoreline erosion protection and flood control applications. In one embodiment, a barrier wall system is provided that is comprised of a plurality of flexible bulk containers that according to one aspect of the invention are configured to be linked together. Preferably, sand is used to fill the bulk container, but other suitable fill materials may be used as well depending on the specific application needs.

Flexible bulk containers or bags (also known as flexible intermediate bulk containers or FIBCs in the industry) have been used to store and/or transport a variety of materials, such as manufactured goods, powders, agricultural products, construction materials, and excavation debris. They come in a

variety of three-dimensional shapes such as tubular and rectilinear, and in sizes suited to the type and quantity of material to be stored. Bulk containers have a body made of a flexible woven natural or synthetic fabric; the latter typically being polymer-based. Bulk containers made from a polymeric fabric are light-weight yet quite strong, being capable of holding a ton or more of material. Polymeric fabrics also advantageously may be wetted without a loss in strength of the material. Accordingly, bulk containers embodying the novel features and method of use described herein are well suited for shoreline erosion protection and flood control applications.

In one embodiment, a flexible bulk container formed according to principles of the present invention preferably has a body made from a woven synthetic fabric; more preferably a polymeric-based material. In one embodiment, the body of the bulk container is made from woven polypropylene fabric preferably having two-ply construction for added strength. Although a synthetic fabric is preferred for constructing a bulk container because of its strength and ability to be wetted without a loss in performance or strength, a bulk container made of natural materials or a combination of natural and synthetic materials may be used.

Preferably, the bulk container includes sidewalls, a bottom, and an openable/closeable top. Vertical seams may be provided between adjoining sidewalls, the bottom, and top that in some embodiments are formed by stitching or welding sections of fabric together. Preferably, a means for at least partially closing the top is provided to prevent loss of a substantial amount of bulk fill material when the container is subjected to rushing water. More preferably, the top is essentially fully closeable. In one embodiment, the top includes a top panel attached to sidewalls and an elongated tubular neck connected to the top panel. The neck communicates with the interior of the bulk container and may be used to fill and empty the contents of the container. The neck preferably has one end that may be closed by any conventional means, such as drawstrings for example. In another possible embodiment, the container top includes a plurality of top flaps that may be folded over each other to close an otherwise open top. This latter top structure advantageously provides full access to the interior of the container and its contents when opened, but is also fully closeable. Other top closure arrangements may be provided so long as the contents of the bulk container remain substantially intact against the forces of rushing water and/or wave action against the exterior of the container when used in a bulkhead or barrier wall system.

Preferably, the bulk container has a closed bottom which may be formed as part of or joined to the sidewalls by stitching, welding, or other suitable means. This will help ensure that the bulk fill material does not substantially leak out from the bottom of the container when it is immersed in water and/or subjected to rushing water or wave action. Alternatively, the bulk container may be provided with an openable/closeable bottom such as a commercially-available quick-release feature to allow the contents or fill material to be quickly dumped. Accordingly, the invention is not limited by the type of bottom structure provided for the bulk container.

In one embodiment, the bulk container preferably has a three-dimensional rectilinear shape, and more preferably is in a form approximating a cube having a top, bottom, and side panels of approximately equal dimension. Rectilinear shapes are preferred to facilitate coupling or joining two or more bulk containers together into a wall or bulkhead system, as more fully described herein. However, other shapes such as tubular sidewalls, etc., may be used according to principles of the invention which is not limited in this regard.

It will be appreciated that even rectilinear bulk containers may tend to assume a slightly tubular shape with a rounded horizontal cross-section when the fill material is loaded therein. The fill material causes sidewalls to bulge slightly and assume a slightly rounded shape due to the weight of the fill material. Such bulging is typical and expected for bulk containers, and generally should not adversely affect the use of the bulk container to construct a bulkhead or wall. In one preferred embodiment, however, the sidewalls may include rigid or semi-rigid stiffening panels to resist bulging and maintain a more rectilinear container shape. In one embodiment, the stiffening panel is removeable and may be held in a receptacle such as a pocket attached to a sidewall.

According to another aspect of the invention, a preferred bulk container does not have a fully rigid frame and is at least partially collapsible. This allows the bulk containers to be advantageously folded into a relatively flat form to facilitate bailing and palletizing compactly for economical handling and shipment to the installation site where the containers can be filled with a suitable bulk material. Although a bulk container that does not have a rigid frame is preferred, a bulk container having rigid structural reinforcing or stiffening members at various locations such as at sidewall edges, corners, faces, etc.

The bulk container preferably also includes a means for lifting the containers such as lifting straps attached to or formed as an integral part of the container. In a preferred embodiment, lifting straps are provided at each top corner of the container. The lifting straps may be engaged by a forklift, backhoe, crane, or similar construction equipment to allow a filled bulk container to be hoisted, moved into position, and adjusted as required

According to another embodiment, the preferred bulk container also includes a means for connecting the bulk containers together laterally and/or vertically to provide a horizontally-extending bulkhead or barrier wall system with sufficient strength to resist dislodgment of individual container units from the bulkhead due to the forces imposed by rushing water and/or waves lapping against the wall. Therefore, the structural integrity of the wall will not be compromised by displacement of individual bulk container units because each of the interconnected units are mutually supported by adjacent units; the units forming an integrated bulkhead. In another embodiment of a wall system, the containers may also be vertically stacked and interconnected.

For shoreline erosion protection applications, the preferred fill material for the bulk container is sand. The sand may be reclaimed from the beach at the installation site or new sand may be trucked to the site, either already loaded in the bulk containers or separately for filling the bulk containers at the site. Other suitable materials such as pea gravel for example, may be used in lieu of sand depending upon the types of materials permitted by local ordinances of the seaside community, availability, and material and transportation costs. These considerations will dictate the optimum fill material to be used for a given application.

Various aspects of a bulk container made according to the present invention provides the following advantages. First, woven polypropylene may be wetted and is resistant to the corrosive effects of saltwater. The preferred two-ply weave construction is also extremely strong, yet light-weight. Accordingly, an empty bulk container may be capable of holding a ton or more of fill material, yet may weigh less than ten pounds empty. In contrast to known bulkhead materials, such as boulders and large concrete shapes, the containers may be compactly folded, palletized, shipped to the installation site, and filled at the site. This considerably reduces shipping and handling costs in contrast to known bulkhead materials.

Preferably, the polypropylene fabric used for the container has a weave (threads per inch of suitable denier) tight enough to allow water to infiltrate into, but readily drain out from the container with the ebb and flow of the tide without a substantial loss of the bulk material stored within escaping through the pores of fabric. The permissible weave tightness and concomitant pore size will be readily determinable by those skilled in the art based on the specific bulk fill material to be stored in the bulk container. In addition, the top closure means provided herein will ensure that a substantial amount of fill material is not lost from the top of the container when subjected to wave action.

All of these foregoing characteristics make bulk containers having the novel features and method of use described herein an ideal, practical, and economic solution for shoreline erosion protection bulkheads or barrier wall systems which heretofore has not been recognized and fully appreciated.

The foregoing and other features and advantages of the present invention will be more readily understood upon consideration of the drawings and detailed description of the preferred embodiments which follow herein, all of which illustrate by way of example only the principles of the invention. In the definitions and descriptions provided herein, any reference to either orientation or direction is intended primarily for the convenience in describing the preferred embodiment and is not intended in any way to limit the scope of the present invention thereto; the scope of the invention being defined by the claims appended hereto, and not by the exemplary embodiments described herein.

Although the preferred embodiments of a bulk container and wall system, and method of use may be described herein in reference to shoreline erosion protection applications, the invention is not limited to such uses alone. Accordingly, the invention may be used with fresh or saline water, and in other applications such as flood control and erosion protection associated with rivers, lakes, or other impoundments of water that may breach their normal containments during storm or other events.

BRIEF DESCRIPTION OF THE DRAWINGS

The features of the preferred embodiments will be described with reference to the following drawings where like elements are labeled similarly, and in which:

FIG. **1** shows a front perspective view of a preferred embodiment of a bulk container body in the form of a cube;

FIGS. **2-6** show front perspective views of the container body of FIG. **1** with a first possible embodiment of a closeable top having a plurality of flaps in various stages of the flaps being folded over the body;

FIG. **7** shows a detailed view of one embodiment of a cinch buckle useable with a bulk container according to principles of the present invention;

FIG. **8** shows a detailed view of a second alternative embodiment of a buckle useable with a bulk container according to principles of the present invention;

FIG. **9** shows the bulk container body of FIG. **1** with one possible embodiment of lifting straps useful for transporting a bulk container;

FIG. **10** shows the bulk container body of FIG. **1** with linking straps, linking loops, and a connecting member for creating an interlinked bulk container wall system;

FIG. **11** shows a detailed view of a linking strap, linking loop, and connecting member taken from FIG. **10**;

FIG. **12** shows a front view of an interlinked bulk container wall system formed with the containers shown in FIG. **10** and in which certain appurtenances omitted for clarity;

FIG. **13** shows a front perspective view of the container body of FIG. **1** with a second embodiment of a closeable top and other appurtenances;

FIG. **14** shows a detailed front view of a linking loop according to principles of the present invention taken from FIG. **10**;

FIG. **15** shows a front view of an interlinked bulk container wall system formed with the containers shown in FIG. **13** and in which certain appurtenances have been omitted for clarity;

FIG. **16** shows one embodiment of a lifting strap useable with bulk container body of FIG. **1** in which the linking loops of FIG. **14** are incorporated with the lifting straps;

FIG. **17** shows a cross section through one embodiment of a sidewall taken from FIG. **13** having one possible embodiment of a stiffening member for reinforcement of the sidewall; and

FIG. **18** shows a detailed view taken from FIG. **2** of an aperture in the flaps.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In order that the invention may be understood, preferred embodiments which are given by way of example only, will now be described with reference to the appended drawings. Accordingly, the preferred embodiments are described for convenience of reference and without limitation of the invention to embodiments described herein. The scope of the invention being defined by the claims appended hereto

FIGS. **1** and **2** are perspective views of a preferred embodiment of a flexible fabric bulk container formed according to principles of the present invention. FIG. **1** shows only the body of the bulk container without the top cover in place.

A bulk container **20** in one embodiment is depicted as including vertical sidewalls such as four sidewall panels **21**, **22**, **23**, **24** which together define a body **25**. For convenience of reference and without limitation, panels **22**, **24** may be considered rear and front sidewall panels, respectively, and panels **21**, **23** may be considered right and left lateral sidewall panels, respectively. Each sidewall **21-24** may have a top edge **26***a*, bottom edge **26***b*, and two longitudinally-extending vertical edges **26***c* as shown in FIG. **1**. Body **25** defines an interior cavity for holding a bulk material.

Bulk container **20** further includes a floor or bottom panel **27** that is attached to the lower portion of body **25** and preferably forms a closed bottom. Sidewall panels **21-24** further define a top opening **29** as shown through which materials may be loaded into or emptied from bulk container **20**.

As shown in FIG. **1**, body **25** of bulk container **20** has a width WB, depth DB, and height HB. In a preferred embodiment, WB, DB, and HB are each about 3 feet to provide a bulk container storage capacity or volume of approximately one cubic yard of fill material. Other dimensions are contemplated and it will be appreciated that WB, DB, and HB may be any suitable dimension depending upon the type and weight of material desired to be stored in the bulk container, type and strength of the fabric, etc. For example, WB, DB, and HB may each be about 1 meter for a bulk container **20** that holds approximately 1 cubic meter of fill material. Accordingly, the invention is expressly not limited with regards to the preferred dimensions and volumetric capacity described herein.

Preferably, bulk container **20** is made from a flexible woven synthetic fabric such as polypropylene or another suitable synthetic of the types commonly used today for bulk containers. Such synthetic fabrics are relatively light in weight, economical to produce, and yet extremely strong. For shoreline erosion control applications exposed to water, the preferred fabric in one embodiment is two-ply polypropylene of a suitable thread count to form a weave with a porosity sufficient to allow water to infiltrate and drain back out from the bulk container without a substantial loss of the fill material stored therein. A preferred fill material for shoreline erosion control is sand. Therefore, the pores of the bulk container are preferably of an appropriate size to retain this type of fill material unless another type of fill is used.

Bulk container **20** further includes a means for closing the top of the container which in a preferred embodiment may be top cover **30**. Cover **30** preferably includes a plurality of overlapping flaps to ensure that the fill material contained in bulk container **20** does not leak out by wave action. As shown in FIG. **2**, cover **30** may include four top closure flaps **31**, **32**, **33**, **34** in one embodiment. For convenience of reference and without limitation, flaps **32** and **34** may be considered rear and front top flaps, respectively, and flaps **31** and **33** may be considered right and left lateral top flaps, respectively. Each flap may include three free edges **37** and one fixed edge **36** which is secured to an upper portion of body **25**, preferably along top edge **26***a* of the body. The various intersections of edges **36**, **37** with each other forms four corners **38** as shown. For the sake of brevity, edges **36**, **37** and corners **38** are only shown for top flap **32** in FIG. **2**, but it will be recognized that each flap preferably also has three free edges **31**, one fixed edge **32**, and four corners **38**.

Top flaps **31-34** preferably each are cooperatively configured with a sufficient width and length to completely bridge across top opening **29** from sidewall panel to sidewall panel. This arrangement provides some degree of protection against the contents being washed out of the top opening by rushing water and wave action. In the preferred embodiment, at least three flaps are provided in cooperative overlapping engagement when folded over top opening **29**. This arrangement provides the top of bulk container **20** with three full thicknesses of fabric covering top opening **29** when the flaps are all folded over the opening. More preferably, however, bulk container **20** has four flaps that overlap each other and top opening **29** as shown in the figures and for reasons which will become apparent as described below.

Bulk container **20** may be constructed by joining various fabric parts together as described herein (i.e., top flaps **31-34**, bottom panel **27**, and side panels **21-24**) along their respective edges by any conventional means commonly employed in the art. This includes, but is not limited to stitching the seams using one or more rows of a thread of suitable tensile strength and material as will be known to a skilled artisan in the industry, welding seams by chemical, heat, or adhesive means, etc. The joined edges of two or more parts will be defined and referred to herein as a "seam" regardless of the joining method.

Although sidewalls **21-24**, bottom or floor panel **27**, and top flaps **31-34** are shown in FIGS. **1** and **2** as being separate parts or components, it should be noted that these components need not be all separate pieces joined together along their respective edges. Rather, several of these component parts may be formed from a single piece of material which are ultimately joined together to form bulk container **20**. For example, in a preferred embodiment, lateral side panels **21**, **23** and bottom panel **27** may be formed from a single seamless U-shaped piece of fabric to which rear and front sidewall panels **22**, **24** are attached. Alternatively, sidewall panels **21-24** may be formed from a single seamless piece of material resulting in only one vertical seam between the sidewalls.

Accordingly, the lines shown between the sidewalls, top cover, and bottom panels shown by a vertical and horizontal lines should therefore not be interpreted as requiring an actual physical edge, but may actually represent only a change in direction from panel-to-panel. Therefore, the invention is expressly not limited in this regard.

A preferred embodiment of a bulk container further includes a means for securing two or more of the top flaps **31-34** together when folded over top opening **29**. Referring generally to FIGS. **2-5**, and particularly to FIG. **3**, in one embodiment the means for securing multiple top flaps together includes at least one of the top flaps such as top flap **34** including two straps **40** each having a fixed end **41** secured to the flap and a free end **43**. Fixed end **41** may be secured to flap **34** by any method commonly used in the art, such as preferably stitching strap **40** to top flap **34** using thread of a suitable tensile strength and material, such as polypropylene, polyester, etc. In one embodiment, fixed ends **41** are arranged diagonally across from each other on top flap **34** and fastened to the top flap generally proximate two diagonally-opposed corners **38**. Preferably, straps **40** are made of woven material of suitable strength to secure the top cover **30** in use such as the type used for automotive seat belts like Terylene webbing (polyethylene terephthatlate) or similar. However, any suitable strap material known in the art may be used. Straps **40** may preferably be at least 1 inch wide; and more preferably about 2 inches wide in one possible embodiment. Any suitable strap widths may be used based upon the desired strength required for a particular application.

The preferred means for securing multiple top flaps **31-34** together further includes flaps **31** and **33** defining apertures **50** through which free ends **43** of straps **40** may be passed. Preferably, apertures **50** are elongated in shape such as a slit, oval, or similar (see FIG. **18**) and sized to complement the size and shape of straps **40** so that free ends **43**, and any fastening means for holding the free ends together that may be provided as described herein, may be passed through the apertures. The apertures, however, may have other suitable shapes such as round. The fabric surrounding the apertures preferably is reinforced to prevent tearing and/or tattering of the woven polypropylene fabric by straps **40**. The reinforcement may be provided in the form of reinforced stitching surrounding aperture **50**. Alternatively, the reinforcement in a preferred embodiment may be in the form of a separate plastic or metallic insert such as grommet **51** of suitable shape and size to accommodate straps **40** and any strap fastening means provided. Preferably, grommet **51** is oblong or oval in shape; however, a conventional circular grommet of sufficient diameter to allow straps **40** and any fastening means provided to be threaded through aperture **50** may be used.

It will be appreciated that other suitable means for securing two or more of the top cover flaps **31-34** together may be used so long as the top flaps are interconnected and secured together.

As shown in FIGS. **5**, **7**, and **8**, straps **40** may further include a fastening means for releaseably joining ends **43** of the straps together and locking down flaps **31**, **33** and **34**. In one embodiment of a fastening means shown in FIG. **7**, a conventional buckle **52** is provided on one strap **40** with the remaining strap **40** includes a plurality of spaced-apart holes **54** for receiving elongated tongue **53** of the buckle. Holes **54** may be reinforced by attaching grommets **55** to the strap **40** as shown. Alternatively, a self-tightening type of fastening means may preferably be provided. For example, in one embodiment shown in FIG. **8**, a self-tightening fastening means includes free end **43** of one of the straps **40** having a commercially available one-way, self-tightening cinch buckle **56**. Free end **43** of one strap **40** is passed over and under one transverse bar **57**, and secured back onto itself with stitching **58** to form the stationary strap. The moving strap is formed by free end **43** of the remaining strap **40** having a plain end. The plain end is looped over and under another transverse bar **57** as shown so that pulling on the plain free end **43** continuously tightens or cinches up straps **40** together. Teeth **59** are typically provided on a transverse end piece of buckle **56** to grip strap **40** in a direction opposite the tightening direction. This prevents the strap **40** from loosening once tightened, unless the strap is manually lifted out of engagement with teeth **59** and fed back through buckle **56**.

It will be appreciated that other suitable commercially-available fastening means may be used to hold free ends **43** of straps **40** together so long as the top flaps may be interconnected and mutually secured together to close the top of bulk container **20**. Accordingly, the invention is not limited in this regard.

Because the bulk containers **20** are expected to be immersed and subjected to rushing water and/or wave action when used in a shoreline erosion control application, it will be appreciated that some of the bulk fill material stored in the containers may escape through top opening **29** without some provision for adequately closing and securing the top down. Accordingly, the foregoing top closure system using multiple overlapping flaps that are secured together provides one possible means for enclosing the top of the bulk container. Advantageously, the multiple layers of fabric created by overlapped top closure flaps **31**, **32**, **33**, **34** reduce the chance that substantial fill material loss may occur. Straps **40** threaded through apertures **50** in top flaps **31**, **33** secures the multiple top flaps **31**, **33**, **34** together to resist the forces of the water and waves which will try to pull the top flaps open. And finally, fastening means such as buckles **52**, **56**, or similar means for holding free ends **43** of the straps **40** together completes the top closure system by positively locking flaps **31**, **33** and **34** down. Thus, these features of the present invention provide a resulting bulk container with a significant advantage over known bulk containers for shoreline erosion control applications or any other applications where the need to have a secure top closure is desired.

Referring now to FIGS. **2** and **6**, top flap **32** of bulk container **20** may further include at least two straps **60** each having a fixed end **61** attached to top cover flap **32** and a free end **62**. Front sidewall panel **24** may have a complimentary pair of straps **63** each having a fixed end **65** attached to panel **24** and a free end **64**. Fixed ends **61**, **65** may be attached to flap **32** and panel **24**, respectively, in a similar manner described above for fixed ends **41** of strap **40** such as by stitching. Preferably, straps **60**, **63** are made of woven material used for automotive seat belts similar to straps **40** described herein. Preferably, straps **60**, **63** may be at least 1 inch wide; and more preferably are at least 2 inches wide. Free ends **62** or **64** of each pair of straps **60**, **63** may be provided with a fastening means such as buckle **52** as shown in FIG. **7** to secure the free ends of each pair of straps together. The other free end **62** or **64** not furnished with a buckle **52** is preferably provided with apertures **54** for receiving tongue **53** of the buckle. Alternatively, a self-tightening cinch buckle **56** as shown in FIG. **8** may be provided.

The pairs of straps **60**, **63** and buckles **52** serve a similar function as straps **60** and buckle **52** shown in FIG. **5**, which in this instance is to provide a fastening means for releaseably joining free ends **62**, **64** of straps **60**, **63** together to lock down top flap **32** to bulk container **20**. This helps to ensure that top flap **32** is not readily opened by wave action, thereby exposing already folded over flaps **31**, **33**, **34** and straps **60** with buckle

56. Furthermore, top cover flap **32** provides some protection against curious persons visiting the shoreline from tampering with buckle **52** of straps **40** which are covered and hidden by flap **32**. Therefore, flap **32** when locked down on bulk container **20** provides at least an extra barrier which must be undone to gain access to straps **40**.

It will be appreciated that any other suitable commercial fastening means may be used to hold free ends **62** and **64** together so long as the top cover flap **32** may be suitably secured to the bulk container. Alternatively, free ends **43** may simply be tied together in a knot. Accordingly, the invention is not limited in this regard.

As shown in FIG. **9**, the preferred means for lifting bulk container **20** are straps which are configured and attached to the container to form lifting straps **70**. Lifting straps **70** are adapted and shaped to be engaged by a forklift, backhoe, crane, or similar motorized construction equipment to allow a heavy filled bulk container to be transported and maneuvered into position. Any suitable material may be used for lifting straps **70**. Preferably, lifting straps **70** may be made from the same automotive seat belt strapping as top closure straps **40** described above. Preferably, lifting straps **70** are at least 2 inches wide. It will be appreciated that any suitable material or width may be used for lifting straps **70** so long as the suspended load of a filled bulk container may be sufficiently supported.

Referring still to FIG. **9**, in the preferred embodiment an 8-point attachment system having four lifting straps **70** is provided. Each lifting strap **70** includes two spaced-apart legs **73** with ends **71** which are attached to body **25** of bulk container **20** along at least a portion of the legs. Preferably, lifting strap **70** is attached to body **25** by stitching, although other suitable known means such as welding, adhesives, etc. may be used. Lifting strap legs **73** are preferably attached to body **25** of bulk container **20** by an amount and number of rows of stitching sufficient to provide adequate strength for supporting a filled bulk container while it is suspended in air. Lifting strap **70** is configured and attached to bulk container **20** in a manner to form an open curved portion **72** that may be engaged or hooked by the aforementioned construction equipment. In one possible embodiment shown in FIG. **9**, the four lifting straps **70** are arranged so that one lifting strap is attached to each sidewall panel **21**, **22**, **23**, and **24**. In one possible embodiment as shown, each lifting strap **70** may be positioned so that the curved portion **72** of the loop is approximately aligned with the vertical centerline or axis of each sidewall panel. Although ends **71** and legs **73** of the lifting strap **70** are shown extending approximately halfway down each sidewall panel **21**, **22**, **23**, **24**, it should be recognized that any suitable vertical extent of attachment length may be provided depending on the weight of the bulk container load to be supported. Accordingly, lifting strap legs **73** in some possible embodiments may extend from top edge **26***a* of a side panel all the way down to the bottom panel **27** (not shown) or, strapping **70** be one single length wrapping completely around the bottom of bulk container **20** from the top edges **26***a* of two opposite sidewall panels (e.g., panels **21**, **23**) to form a continuous U-shaped strap (not shown).

In another possible embodiment shown in FIG. **13**, four lifting straps **70** are provided which may be secured at each corner of bulk container **150**. In one embodiment, free ends **71** and at least a portion of leg **73** are preferably stitched to body **25**. Legs **73** may be sewn into the vertical corner seams between the sidewall panels at the same time the corner seams are made.

It will be appreciated that other numerous variations of suitable lifting means may be used wherein the number of lifting straps provided, their configuration, arrangement on bulk container **20**, etc. differ from the preferred embodiment described and shown herein. For example, one alternative means for lifting the bulk container may have an 8-point attachment system configured such that the spaced-apart strap legs **73** straddle each top corner so that four loops are arranged diagonally across from each other at the corners (not shown). In another possible embodiment, the lifting means may be provided by a pair of elongated parallel horizontal sleeves formed out of the bulk container **20** fabric itself along the top edges **26***a* of two opposite sidewall panels (e.g., panels **21**, **23**) through which the rails of a forklift may be inserted (not shown). Accordingly, many variations of lifting straps are possible and the invention is not limited to the preferred embodiment described herein.

The preferred method of filling and closing a bulk container **20** will now be described with reference to FIGS. **2-6**. The bulk containers **20** may be filled at a remote site and transported to the intended final installation site. Alternatively, bulk containers **20** are preferably transported empty to the final installation site and are filled there. This provides the opportunity to fill the bulk containers with either materials trucked to the site or with local materials from the site if desired such as existing beach sand which can then be returned to the environment when the containers are emptied. Therefore, no foreign materials need be introduced into the seaside environment. Bulk containers **20** may be filled and then lifted into their final position or placed in the final position and then filled.

After the desired fill material is placed in bulk container **20**, flap **34** is first closed over open top **29** as shown in FIG. **3**. Next, either flap **31** or **33** is folded over flap **34**. In FIG. **4**, flap **33** is shown folded over flap **34** while at the same time threading both straps **40** attached to flap **34** through holes **50** in flap **33**. Flap **31** is then folded over flap **33** as shown in FIG. **5** while threading straps **40** through holes **50** in flap **31**. Free ends **43** of straps **40** are secured together and tightened using buckle **56** (FIG. **7**) as shown in FIG. **5**.

As shown in FIG. **6**, the final top flap **32** is next folded over flap **31** and secured down to bulk container **20** using straps **60** and **63** which are joined together by self-tightening buckle **56**. Accordingly, top opening **29** of bulk container **20** is now covered by four layers of overlapping flaps **31**, **32**, **33**, and **34**. When bulk container **20** is used in a shoreline erosion protection application, the multiple overlapping flap arrangement helps prevent a substantial amount of bulk fill material such as sand from being washed out of the containers by wave action. Flap **32** also serves to cover and protect straps **40** and buckle **54** which are the primary means of securing underlying flaps **31**, **33**, and **34** together. Flap **32** further conceals straps **40** and makes access thereto more difficult to persons who may attempt to tamper with the bulk containers.

The contents of bulk container **20** may subsequently be removed by opening the top flaps in a reverse fashion (i.e., opening the strap buckles and top closure flaps, and inverting the bag to empty its contents.

FIG. **13** shows a second possible embodiment of a bulk container. Bulk container **200** has an alternative means for closing open top **29** of bulk container body **25**. In this embodiment, a top cover **150** includes top panel **155** having edges **159** that are joined to top edges **26***a* of body **25** which may be the same as shown in FIG. **1** and described herein. Top panel **155** defines a preferably circular opening **152** to which is joined one end **160** of an elongated cylindrical tube **153**. Tube **153** may be joined to top panel **155** by any suitable means, such as stitching or welding. The tube may have a vertical seam **161** as shown. Tube **153** also has a second free end **162**

defining an aperture **154** through which bulk fill material may be added to and removed from bulk container **20** via tube **153**. A means for closing tube **153** is provided which in one embodiment may include a drawstring **157** moveably secured to free end **162** of tube **153** by forming a pocket **156**. The pocket may be formed by rolling over and stitching the edge of the tube to itself providing an annular cavity in which drawstring **157** may be threaded. Pulling drawstring **157** tightens and closes the aperture **154** on the tube. Drawstring **157** may then be knotted to secure the closure. A pair of fixed tie-off strings **158** may also be provided which are spaced apart from drawstring **157** and located lower on tube **153**. The ends of string **158** are wrapped around tube **153** to cinch the tube closed and then are knotted together. Alternatively, only fixed strings **158** may be provided in lieu of drawstring **157**.

Tube **153** may be made from any suitable material so long as the tube has sufficient flexibility to allow it to be drawn together by the drawstring and/or fixed string. In one embodiment, tube **153** is made from coated polypropylene. The drawstring and fixed string may be made from any suitable material, such as narrow sections of seat belt-type strapping as described herein in conjunction with strapping **40**. The strapping should preferably be narrow enough to allow the free ends of the drawstring or fixed strings to be tied together.

A preferred method for filling and closing bulk container **150** shown in FIG. **13** includes filling the container with a fill material, such as sand for example, through cylindrical tube **153**. Drawstring **157** is next pulled tight to close aperture **154** at the top of tube **153**. It should be noted that as the tube fabric is cinched together by pulling the drawing, the fabric will pucker and it may not be possible to completely close off aperture **154**. Fixed strings **158** are tightly wrapped around tube **153** and the free ends are knotted together. The bulk material contents of bulk container **150** are now secured within and resistant to being washed from the container by rushing water and/or wave action. The contents of the bag may subsequently be removed by opening the drawstring and fixed strings, and inverting the container to empty its contents.

FIGS. **13** and **17** show a bulk container having sidewall panels that may be stiffened to provide some rigidity to the container and maintain a more substantially rectilinear shape when filled with a bulk material. This is advantageous when constructing a barrier wall system as described herein where it is desirable to be able to snugly abut adjacent bulk containers. Stiffened sidewalls according to one possible embodiment described herein may be used with bulk containers **20** or **150**, or any other bulk container. FIG. **17** shows a cross section through a typical sidewall panel that is stiffened.

Referring to FIG. **17**, sidewall panel **21** is preferably placed adjacent sidewall panel **21** and may be configured to hold a stiffening member **182**. Preferably, stiffening member **182** is located close enough to sidewall panel **21** so that the weight of the bulk material will force the stiffening into contact with the sidewall panel. The load produced by the weight of the bulk material will then be distributed to sidewall panel **21** through stiffening member **182**.

In one embodiment, sidewall panel **21** is configured with a pocket **180** to hold a stiffening member **182**. The pocket may be formed by attaching a panel of material to sidewall panel **21** along three edges to create an opening **181** adjacent the remaining edge of the pocket. Preferably, opening **181** is located at the top of pocket **180**. Pocket **180** may be stitched into the edges of adjoining sidewall panels and the floor panel **27** when the bulk container is fabricated, as shown in FIG. **17**. Alternatively, pocket **180** may be stitched or attached to sidewall panel **21** directly by any other suitable means such as by welding, fusion, adhesives, etc. Preferably, pocket **180** has a width and height that is approximately coextensive with the width and height of the sidewall panel to which it is attached to maximize resistance of the sidewall panel to bulging when the bulk container is filled with bulk material. Pocket **180** may be made of any suitable flexible material, such as a coated polypropylene sheet in one preferred embodiment.

Stiffening member **182** may be rigid or semi-rigid in design, and is preferably substantially planar having the general shape of a relatively thin panel or sheet with a height and width substantially larger than its thickness. Stiffening member **182** is also preferably approximately coextensive in width and height to the sidewall panel intended to be reinforced and is sized to fit into pocket **180**. In some possible embodiments, stiffening member **182** may be a solid sheet of material or have apertures therein such as a mesh or perforated sheet. In some possible embodiments, stiffening member **182** may be made of metal, plastic, cardboard (preferably coated to be water resistant) or other suitable material that will provide some degree of rigidity to the sidewalls. Preferably, at least one sidewall panel may contain a stiffener if used. More preferably, all four sidewall panel **21-24** have a stiffening member **182**.

In other possible embodiments, it is contemplated that stiffening member **182** may be attached directly to the sidewall panel intended to be reinforced with the use of a pocket. Accordingly, stiffening member **182** may be directly attached to sidewall panel **21** by stitching, adhesives, or other suitable methods. It is contemplated that in some embodiments stiffening member **182** may flex and bend under the weight of the bulk material. Accordingly, stiffening member **182** is not expected to completely prevent the sidewalls of the bulk container from bulging, but instead control and reduce bulging in some embodiments.

According to a further aspect of the invention, a bulk container system is provided that is comprised of a plurality of interlinked individual bulk containers. Whereas known bulk containers have been limited in use primarily for storing bulk materials, the ability to positively and securely link a plurality of bulk containers together in the manner described advantageously permits the creation of a structural barrier wall with suitable strength to resist externally applied loads, such as those imparted by rushing water and/or wave action for example, which would otherwise dislodge and scatter individual bulk container units. Such a bulk container system wall may be beneficially employed as a bulkhead or barrier for shoreline erosion protection or flood control applications. Accordingly, the bulk container system of the present invention expands the possible uses and exploits the advantages of known bulk containers in a manner heretofore not fully appreciated in the art.

A bulk container **20** suitable for forming an interlinked bulkhead or barrier wall preferably includes a means for linking a plurality of bulk containers together. In one embodiment, the linking means may include at least one sidewall panel preferably having at least one linking loop **81** and a connecting member such as a tensionable belt **90** to connect the linking loops together on adjacent abutted bulk containers. Preferably, at least the front sidewall panel is provided with the linking means. In another embodiment, linking loops **81** may be attached to or form an integral part of at least one horizontally-extending linking strap **80** attached to a sidewall panel. The combination of linking straps, loops, and connecting members form a lateral contiguous link that joins a plurality of bulk containers together. In an alternative embodiment, linking loops **81** may be attached directly to a sidewall panel as further described herein.

Referring to one possible embodiment shown in FIG. **10**, two horizontally extending linking straps **80** may be provided as shown. In this embodiment, a linking strap **80** each may be attached to body **25** of bulk container **20** at or near the top edge **26***a* and lower edge **26***b* of preferably at least one sidewall panel **24**. In other embodiments, the linking straps **80** may extend horizontally along at least two or more sidewall panels **21-24**. Linking straps **80** are preferably made from the same automotive seat belt strapping as top closure straps **40** described above. Preferably, linking straps **80** are at least 2 inches wide; however, any suitable width may be used.

Linking straps **80** may be attached to body **25** of bulk container **20** by stitching, adhesives, welding, or other suitable methods known in the art. If stitched to bulk container **20**, linking straps **80** are preferably stitched to bulk container **20** using at least one row of stitching, more preferably at least two rows of stitching as shown in FIG. **14**. Preferably, linking straps **80** are attached to bulk container **20** across substantially the entire width WB of the sidewall panel to which they are attached to better distribute tensile loads caused by rushing water and/or wave action striking the interlinked bulk containers over a larger surface area than if the straps were attached to only a smaller portion of the sidewall width. This results in lower unit stresses (e.g., pounds per square inch) on the container sidewall panel and reduces the possibility of tears developing in the container fabric which could possibly result in failure of strap-to-sidewall attachment. However, it should be noted that linking straps **80** may be attached to the bulk container across only a portion of the entire width WB of the sidewall panel depending on the specific application needs, method of attaching the straps to the container, and estimated tidal or fluid forces on the containers.

Reference is now made generally to FIGS. **10-15**. Each linking strap **80** preferably includes at least one linking loop **81** for linking together two adjacent bulk containers. More preferably, at least two spaced-apart linking loops **81** are provided for each bulk container for linking two or more adjacent bulk containers **20** together. In one embodiment, linking loops **81** preferably project generally in a lateral direction outward from the sidewalls. The optimum placement of linking loops **81** on bulk container **20** will depend in part on the length of the loop. Preferably, loops **81** of a predetermined length are spaced away from each vertical edge **26***c* by a distance S (see FIG. **10**) so that loops on adjacent containers do not touch when each are stretched toward sidewall panel vertical edge **26***c*. This allows sufficient room for tightening and tensioning a connecting member such as belt **90** described herein (see, e.g., FIGS. **10** & **11**) that may be used for interconnecting a pair of loops (i.e., one each on adjacent bulk containers **20**). The properly tensioned connecting creates a snug relationship between adjacent abutted bulk containers to best resist the forces of incoming rushing water and/or wave action which will try to dislodge containers from the interlinked wall. In one preferred embodiment, distance S may typically be about 4 inches; however, any suitable distance may be provided. In a preferred embodiment, linking loops **81** are short enough in length and positioned on the bulk container so that the loops on adjacent containers do not touch. It should be noted that in other possible embodiments, linking loops **81** may either be disposed at the sidewall vertical edge **26***c* and/or be long enough so that loops on adjacent bulk containers can be stretched to touch each other depending on the type and size of connecting member used to interconnect the loops.

In one embodiment, linking loops **81** are preferably configured and sized to be large enough to receive a connecting member therethrough (for example, such as belt **90** described herein), but not too excessively large to minimize excess play (defined herein as a possible range of horizontal and/or vertical movement or a combination thereof) when the connecting member is coupled through the loops. Also preferably, linking loops **81** are also kept as short as possible in length to limit their projection from the bulk container. This also reduces excessive play in the loops which is contrary to establishing a snug, tensioned relationship between interlinked adjacent bulk containers. Accordingly, linking loops **81** are preferably substantially shorter in length than lifting straps **70** which must be long enough to allow proper rigging by lifting equipment used for moving the container. For example, bulk containers are commonly rigged by placing all four lifting straps **70** over a single hook on a crane. Therefore, lengths of typically 10-12 inches are not uncommon for lifting straps **70**, whereas linking loops **81** may preferably be typically on the order of 3-4 inches in length in some possible embodiments.

Preferably, linking loops **81** are formed integral with linking strap **80** to maximize the strength of the attachment between the loop and bulk container **20**. In one embodiment, a loop **81** may be formed in strap **80** while it is being stitched to bulk container **20** by stitching **82** down a portion of the strap **80** on itself as shown in FIG. **14**. However, other possible ways of constructing an integral linking loop **81** in linking strap **80** may be used. In other possible embodiments, loop **81** may be a separate piece of strapping or other device (e.g., metallic or plastic rings, etc.) that may be attached to linking strap **80** or directly to bulk container **20** by any suitable method such as by stitching, adhesives, etc. In another possible embodiment shown in FIG. **16**, linking loop **81** is formed as an integral part of lifting strap **70** as it is being stitched to bulk container **20**. Accordingly, the invention is not limited by the material or manner of forming and attaching loops **81** to bulk container **20**, or by their placement on the container.

An alternative embodiment of a linking strap **80** arrangement is shown in FIG. **13** in which a single strap is provided on at least one sidewall panel of a bulk container **150**. Single linking strap **80** may be vertically centered on sidewall panel **24** in one possible embodiment as shown or placed in any other suitable vertical position. Two-spaced apart linking loops **81** may be provided in a similar manner described herein for FIG. **10**. Preferably, a second strap **80** with loops **81** may be provided in a similar manner on rear sidewall panel **22** opposite sidewall panel **24** as shown for flexibility in constructing an interlinked bulk container wall and to maximize the ability of the wall to resist the forces of rushing water and/or wave action which will attempt to push the wall apart.

With reference to FIGS. **10**, **11**, **12**, and **15**, the means for interlinking bulk containers **20** together further includes a connecting member such as belt **90** in one possible embodiment which is received through loops **81** on two adjacent bulk containers **20** as shown. Preferably, belt **90** is capable of being adjustably tightened when engaged with the loops on adjacent bulk containers to create a snug and tensioned relationship between the linked bulk containers. Belt **90** serves to connect linking straps **80** on adjacent bulk containers via linking loops **81**, and in effect creates essentially a long, almost continuous pre-tensioned linking strap spanning across the sidewall faces of a plurality of bulk containers **20** that are linked together. This arrangement advantageously provides optimum resistance to the forces of rushing water and/or wave action which will attempt to separate the bulk container wall. In one embodiment, belt **90** has two free ends **91**, **92** which may be joined together and the belt tightened preferably by using a self-tightening cinch buckle **56** similar to that shown in FIG. **8** described herein. However, any other

suitable buckle or joining means may be used so long as ends **91**, **92** may be joined together and belt **90** tightened. As noted herein, loops **81** are preferably spaced by distance S away from sidewall panel vertical edges **26***c* so that as belt **90** is tensioned or tightened, the linking straps may be pre-tensioned and in addition the vertical edges of adjacent bulk containers **20** advantageously tend to be pulled together. This spacing S also preferably provides sufficient clearance to accommodate the physical width of buckle **56** or other fastening means so that the belts to be properly tightened or tensioned which would otherwise be difficult if, for example, loops **81** were located proximate to the vertical edges **26***c* of adjacent bulk containers. However, it should be noted that in other possible embodiments, loops **81** may be placed at the vertical edges **26***c* of each bulk container **20** for possible use with alternative connecting members such as clips, clasps, openable/closeable rings, one-way tightening wire ties, etc., that may be used to connect linking loops **81** together and require less clearance than belts **90**.

Belt **90** may be preferably made from the same automotive seat belt strapping as top closure straps **40** described above, or from any other suitable material so long as bulk containers **20** may be securely interlinked together using loops **81**. Any suitable width may be used for belt **90** provided the belt may be passed through loops **81**. It should be noted that loops **81** may be joined by any other suitable means other than a belt, such as clips, openable/closeable metal or plastic rings, roping, etc. Accordingly, the invention is not limited by the few possible examples of connecting members used to connect loops **81** together described herein.

Loops **81** may be used not only to horizontally interlink bulk containers **20** together, but may also be used to interlink bulk containers together to form vertically-stacked walls using the same interlinking loops **81** described herein. Vertically-stacked walls will be further described herein.

A bulk container system and method of forming a barrier wall useable in shoreline erosion control applications will now be described with reference to one possible embodiment shown in FIG. **12**. The barrier wall shown in FIG. **12** is formed from a plurality of bulk containers **20** having features and being interlinked in accordance with the principles described herein. The various appurtenances of bulk container **20** not used in linking the containers together are omitted from FIG. **12** to more clearly show the linking technique. The bulk container system shown forms a portion of single-tiered wall which may be a bulkhead or barrier used to mitigate the effects of shoreline or beach erosion, or for flood control applications. Filled bulk containers **20** may be positioned on a beach area **100**, abutted against each other, and then interlinked by passing belts **90** through a pair of loops **81** on adjacent bulk containers (i.e., one loop on each container). Alternatively, empty bulk container **20** may be placed adjacent each other and then filled with bulk material. Free ends **91**, **92** of belt **90** may then be fastened together using cinch buckle **56** as shown in FIGS. **10** and **11** or any other suitable joining means. Adjacent bulk containers **20** are preferably abutted snugly against each other to form relatively close joints between the sidewalls of the containers to reduce the amount of water that may wash through gaps left between the containers. Although two belts **90** are preferably used to link together two adjacent bulk containers as shown (i.e., four loops **81** joined by two belts **90**), it will be appreciated that in other possible embodiments only one belt may be used to join a single pair of horizontally spaced apart loops **81** occupying either the top or bottom position. Alternatively, if bulk container **150** shown in FIG. **13** is used, then only one belt **90** would preferably be used to join a single pair of loops **81** together from adjacent containers (as shown in FIG. **15**).

Using the bulk containers and technique for interlinking them together described herein, a bulkhead or barrier may be formed of any desired length and lateral layout (when viewed from above), such as a straight wall, curved wall, serpentine wall, etc. as required by the particular application. In addition, a wall may be formed having two or more rows deep of interlinked bulk containers (not shown). Preferably, each row of bulk containers may be interlinked using loops **81** and belts **56** in the general manner described above. Also preferably, the vertical edges **26***c* of the bulk containers **20** or **150** in a first horizontal row are staggered with the vertical edges of containers in at least the second row to prevent water from rushing directly through the first and second rows. In addition, successive rows of bulk containers **20** or **150** may be joined using a similar technique of linking loops **81** and belts **90** described herein.

A bulk container system is shown in the form of a barrier wall may also extend vertically. An interlinked wall having at least two or more vertical tiers of bulk containers **20** may be formed by stacking containers on top of one another (not shown). Linking loops **81** and belts **90** as described herein may be used to both horizontally and vertically link bulk containers **20** together in the same manner already discussed herein. The same loops **81** may have two belts **90** passed through each, one for linking to a loop on an adjacent horizontal bulk container **20** and another for linking to a loop on an adjacent vertical bulk container **20**. Alternatively, separate loops **81** may be provided on each bulk container **20** for horizontal linking and vertical linking with the exact location of the loops being determined by the particular application intended. In addition, one or more linking straps **80** may be placed in any desired position or orientation on the container (i.e., horizontal, vertical, or diagonal) depending on the needs of each particular application. Accordingly, the invention is not limited as to the number, location, and orientation/direction of linking loops **81** or linking straps **80** provided on the bulk container. In other embodiments, the first and second vertical tier of bulk containers **20** may be horizontally linked, but not vertically linked. In addition, to provide vertical stability to the bulk container wall, a second horizontal row of bulk containers may be provided as described herein and the second tier (or more) of bulk containers may be offset horizontally rearwards from the face of the front row of bulk container's.

Although FIGS. **16** and **17** show a two-tiered barrier wall using bulk container **20** of FIG. **10** having two vertically-spaced linking straps **80** on a sidewall panel, the bulk container **150** of FIG. **13** may also be used to create vertically-stacked barrier walls.

While the foregoing description and drawings represent the preferred embodiments of the present invention, it will be understood that various additions, modifications and substitutions may be made therein without departing from the spirit and scope of the present invention as defined in the accompanying claims. In particular, it will be clear to those skilled in the art that the present invention may be embodied in other specific forms, structures, arrangements, proportions, sizes, and with other elements, materials, and components, without departing from the spirit or essential characteristics thereof. One skilled in the art will appreciate that the invention may be used with many modifications of structure, arrangement, proportions, sizes, materials, and components and otherwise, used in the practice of the invention, which are particularly adapted to specific environments and operative requirements without departing from the principles of the present inven-

tion. The presently disclosed embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being defined by the appended claims, and not limited to the foregoing description or embodiments.

What is claimed is:

1. A bulk container suitable for forming an interlinked wall of a plurality of containers, the container comprising:

a bottom;

a top changeable in configuration from an opened condition to a closed condition;

a plurality of sidewalls extending between the top and bottom;

a horizontally extending strap attached to at least two of the plurality of sidewalls;

a lifting strap attached to at least a portion of one of the plurality of sidewalls for transporting the container;

at least two linking loops attached to the horizontally extending strap; and

at least one connecting member sized and configured to be received through at least one of the at least two linking loops and to interlink with an adjacent bulk container.

2. The container of claim **1**, wherein the connecting member is a belt.

3. The container of claim **2**, further comprising the belt having two ends and a buckle to releaseably join the two ends.

4. The container of claim **1**, wherein the at least two linking loops are formed as an integral part of the horizontally extending strap.

5. The container of claim **1**, wherein the at least two linking loops are attached as separate components to the horizontally extending strap.

6. The container of claim **1**, wherein the top includes an elongated tube that communicates with an interior cavity of the bulk container for storing a bulk material, the tube being closeable.

7. The container of claim **6**, wherein the tube includes at least one pair of strings for closing the tube.

8. The container of claim **1**, wherein the bulk container is made of woven polypropylene fabric.

9. The container of claim **1**, further comprising a second bulk container as described in claim **1**, the two containers abutted against each other, and wherein the connecting member of one of the two containers engages at least one of the at least two linking loops on each of the containers to form an interlinked wall.

10. The container of claim **1**, wherein the at least two linking loops are spaced by a distance inwards from a vertical edge of the sidewall.

11. The container of claim **1** wherein the horizontally extending strap extends across substantially the entire width of a sidewall.

12. The container of claim **1** wherein the at least two linking loops are integral with and spaced apart along the horizontally extending strap.

13. The container of claim **1** wherein the horizontally extending strap is disposed approximately halfway between the top and bottom of the bulk container.

14. The container of claim **1** wherein the plurality of side walls are flexible and porous.

15. The container of claim **14** wherein at least one of said plurality of sidewalls includes a pocket configured to receive a removable stiff panel that mitigates bulging of the at least one of said plurality of sidewalls when said container is filled with solid bulk material.

16. A bulk container wall comprising:

a plurality of bulk containers according to claim **1** positioned in an abutting relationship,

wherein the connecting member of at least one of the plurality of bulk containers is engaged with at least one of the at least two linking loops on an adjacent bulk container,

whereby an interlinked bulk container wall is formed.

17. The container wall of claim **16**, further comprising the top of each container including an elongated tube that communicates with an interior cavity defined by the plurality of sidewalls of the bulk container for storing a bulk material, the tube being closeable.

18. The container wall of claim **16** wherein at least one of said plurality of sidewalls of one of the plurality of bulk containers includes a pocket configured to receive a removable stiff panel that mitigates bulging of the at least one of said lurality of sidewalls when said one of the plurality of bulk containers is filled with solid bulk material.

19. A method of forming an interlinked wall from a plurality of bulk containers, the method comprising:

providing a plurality of bulk containers according to claim **1**

filling each bulk container with a solid fill material;

positioning each bulk container in a laterally-abutting relationship with at least one other bulk container; and

linking at least one of said at least two linking loops on each bulk container with at least one of said at least two linking loops on an adjacent bulk container to form an interlinked wall.

20. The method of claim **19**, wherein the at least two linking loops of each bulk container project laterally outward from one of the plurality of idewalls of the bulk container.

21. The method of claim **19**, further comprising linking at least one of said at least two linking loops on each bulk container with at least one of said at least two linking loops on an adjacent bulk container using the connecting member of one of the bulk containers.

22. The method of claim **21**, wherein the connecting member is a closeable belt.

23. The method of claim **19**, further comprising the step of stacking another wall of a plurality of bulk containers vertically on top of the wall formed by claim **19** by repeating the steps of claim **19**.

24. The method of claim **19**, wherein each bulk container is alternatively filled with the fill material after the positioning step.

25. The method of claim **19**, wherein the positioning step includes placing each bulk container on a beach area.

26. The method of claim **19** wherein the linking step includes linking at least one of said at least two linking loops on each bulk container with at least one of said at least two linking loops on an adjacent bulk container using the connecting member of one of the bulk containers; and

wherein the method further comprises manipulating the connecting member to pre-tension the horizontally extending strap of adjacent bulk containers.

27. The method of claim **19** wherein at least one of said plurality of sidewalls of one of the plurality of bulk containers includes a pocket configured to receive a removable stiff panel that mitigates bulging of the at least one of said plurality of sidewalls when said one of the plurality of bulk containers is filled with solid bulk material.

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